ELECTRICAL WEST

May 1949
25 cents

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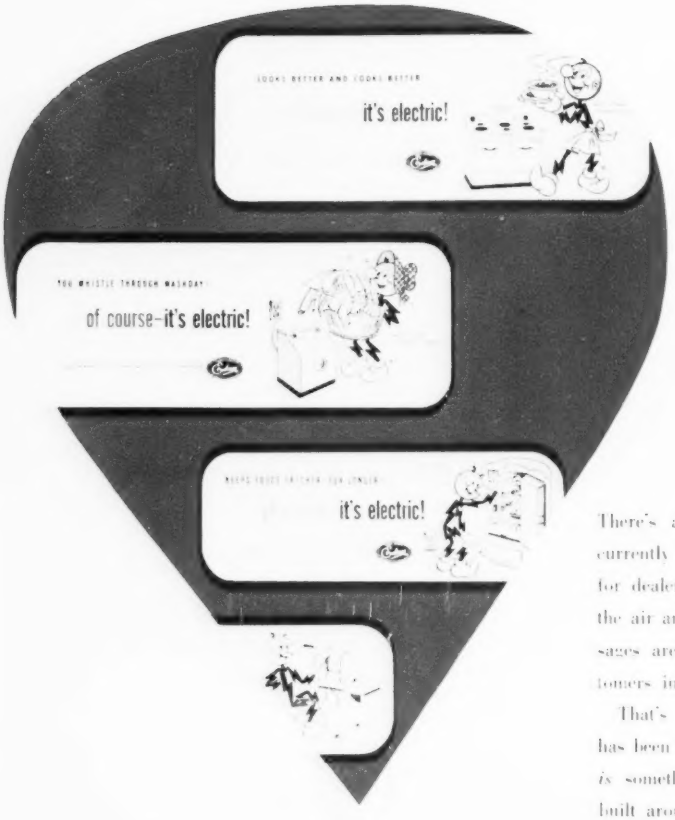
Appliances, Page 82

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U. S.



why "Of Course"

There's a new Edison advertising campaign currently building range and water heater sales for dealers. In newspapers and magazines, on the air and through the mail, hard-hitting messages are telling a dealer story, sending customers in.

That's not a new story. Edison advertising has been doing it for half a century. But there *is* something new about *this* campaign. It's built around a brand new slogan: "Of course it's Electric!"

That "Of course" is a badge of honor. Through the years, cooperation among electric companies, manufacturers and dealers has built a proud reputation for electrical appliances. Customers think of it like this: "If it's dependable and efficient, if it saves time and hard work, if it makes life more comfortable and convenient—it's electric." Of course!

SOUTHERN CALIFORNIA EDISON COMPANY

What's new in street lighting

Here's a Better Way

TO SUPPORT OPTICAL ASSEMBLIES FROM PORCELAIN INSULATORS

General Electric has now developed a new method of supporting optical assemblies for Forms 72 and 45H7 insulators. This new method—a single clamp collar held by one screw—eliminates holes through the porcelain, six screws and an L-shaped bracket. This new collar fits over the lower bead of the porcelain and clamps over the reflector or reflector support holding it against the bottom edge of the insulator. A single screw draws the collar tight.

Here are the main advantages:

Resiliency and Virtually Unlimited Life. Collar is high-quality stainless steel.

Quicker Installation or Replacement—Installing or removing reflector support requires loosening of one screw instead of removing three to six. Eliminates the necessity of gasketing screw holes in porcelain.

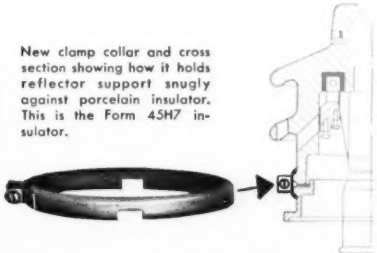
360° Orientation—Reflector support and its reflector can be positioned to any angle with respect to the insulator. Simplifies corner installations.

Stronger—Pressure evenly distributed around periphery of porcelain rather than at three screw holes.

Better Insulation—By eliminating screws through porcelain and internal hardware, electrical design is improved.

Standardization—Clamp collar is interchangeable on Forms 72 and 45H7, either new or existing. Same clamp collar holds reflector support for enclosed Types S, D, and VR optical assemblies, support for *small* enclosed Types CR and CS suburban units, and open Types SO and RW reflectors.

Mr. R. E. Clisdell, street-lighting specialist of the New York City Sales Office, points to the single screw that holds the new stainless steel clamp collar to the porcelain. This is the Form 72 luminaire with Type R reflector-refractor optical assembly.



New clamp collar and cross section showing how it holds reflector support snugly against porcelain insulator. This is the Form 45H7 insulator.

This new G-E clamp collar is one of the many improvements which General Electric has developed for better street lighting. For additional information on this new G-E clamp collar, call your Apparatus Office or write *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

452-86

Are you tying in with the NEMA plan to give America better street lighting?

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

MAY 1949

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.
The all-industry magazine of progress, established 1887, and incorporating the "Electrical Journal," "Journal of Electricity, Power and Gas" and "Journal of Electricity." Contents copyright. Sixty-second year of publication

ELECTRICAL WEST

James H. McGraw (1860-1948), Founder
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W. A. Cyr, Associate Editor — Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor — R. A. Balzari, Publishing Counselor
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Convention-In-Print

The "Convention-In-Print" special June issue of Electrical West is an idea conceived many years ago of presenting a "convention" in printed form for the benefit of the entire industry of the West. On the "program" this year is an array of "speakers" who will discuss the theme, "Let's Face Realities." A leader in each branch of the industry has been selected who will tie in the theme with his particular subject or branch of the industry.

This part of the "convention" will start off with a general industry article followed by articles on public relations and advertising, employee relations program, load building, the replacement market, problems of the contractor, the distributor and the manufacturer.

There will be a philosophical discussion on the problems and the future of the electrical engineer.

Presidents of the three utility associations of the West will present their annual message in print—W. L. Thrailkill for the Northwest Electric Light & Power Association; M. G. Sues for the Pacific Coast Electrical Association, and Harold Rankin for the Rocky Mountain Electrical League.

Concluding the "program" will be a timely article on why we do not need a Columbia Valley Authority.

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Cover photo: On New Dutchman Flat snow course near Bend, Ore., with Aubrey Perry, Deschutes County watermaster, and W. T. Frost, in charge of snow surveys for Oregon, U. S. Soil Conservation Service photo.

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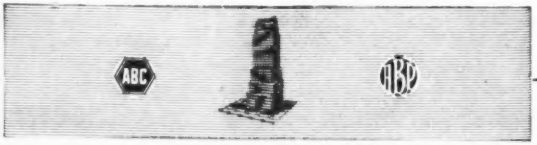
San Francisco (4)	Tom Carmody, 68 Post St., DO. 2-4600



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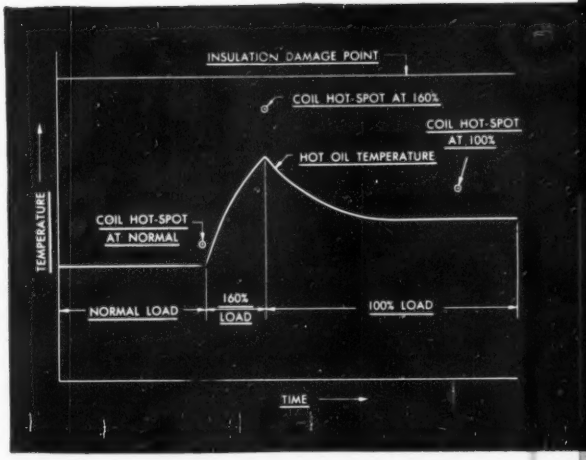
high short time overload capacity because **L-M "ROUND-WOUNDS"** *have* ***built-in cooling***

Obviously no transformer that develops hot spots because of insufficient coil ventilation will take much of an overload, even for a comparatively short time.

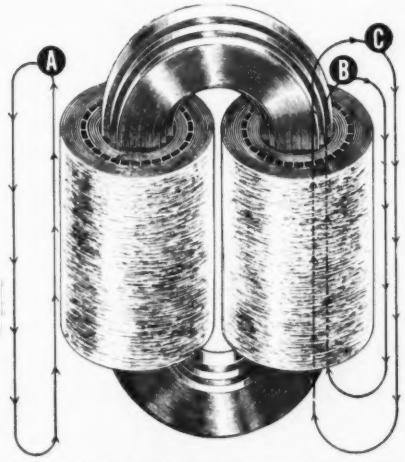
So, to assure real short-time overload capacity, L-M engineers designed a core which has inherently good coil ventilation characteristics. That's what we mean by a cooling system.

No—we aren't recommending Round-Wound 5 kva's for a 10 kva job! But we *do* say that you can expect long life, with an extra margin of short time overload capacity, because of the superior coil cooling of the Round-Wound design.



Typical time-temperature curve for Round-Wound transformers.

The arrows in the illustration below show the flow of cooling oil



Arrows show oil circulation around and through the long round coils, and between core and coils. Exceptional cooling characteristics inherent in the L-M Round-Wound design assure you of unexcelled short-time overload capacity.

As the illustration shows, L-M Round-Wound design provides long round coils which expose more surface (A) to the oil than do shell type transformers. What's more, the Round-Wound design provides oil ducts between the cruciform core and the coils (B) to cool the inner windings. And in the larger sizes we build oil ducts right into the coil windings (C) for still more oil circulation.

How are you going to develop critical hot spots with that kind of cooling? Temperature gradient between windings and top oil remains low, and insulation is protected against damage under severe loading conditions.

Exceptional coil cooling results in high short time overload capacity—one of the several fundamental "Balanced Performance" characteristics found in all L-M Round-Wound transformers. Want more details? Ask the L-M Field Engineer or write Line Material Company, Transformer Division, Zanesville, Ohio.

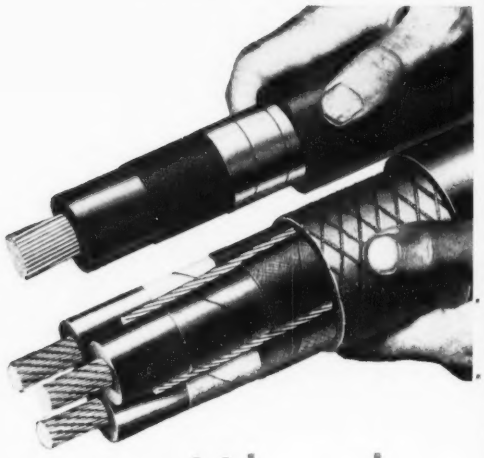
ROUND COILS WOUND CORE

LM

LINE MATERIAL Transformers

Complete Coordinated Equipment for All Distribution Requirements

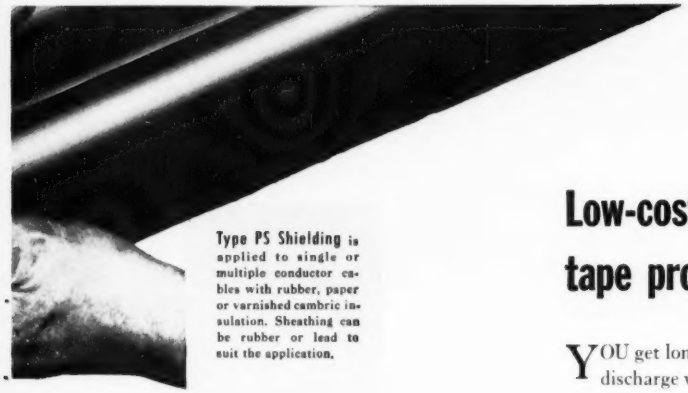
PS SHIELDING



(U. S. Patents 2,322,702 and 2,446,387)

eliminates Corona cutting in

No corona troubles have been encountered with Type PS Shielded Cables during the many years they have been in service.



Type PS Shielding is applied to single or multiple conductor cables with rubber, paper or varnished cambric insulation. Sheathing can be rubber or lead to suit the application.

power cables

Low-cost conducting rubber tape proves highly effective

YOU get longer trouble-free life plus elimination of static discharge when Type PS Shielding is used on rubber insulated cables operating at over 2000 V. For rubber cables this low-cost shielding consists of a fibrous tape coated with conducting rubber, vulcanized to the surface of the insulation. Such a tape may be used over the stranded conductor for protection against internal corona and over the outer surface in contact with the usual shielding tape, ground wires or conducting sheath. The tape eliminates any air gaps between insulation and conducting element as it becomes bonded to the insulation during vulcanization.

Type PS Shielding remains flexible . . . is superior to metal shielding which tends to separate slightly from the insulation when the cable is bent and straightened. This forms air gaps . . . causes a spark discharge with corona and ozone formation.

Type PS Shielding with conducting rubber is a development of the American Steel & Wire Company. It proved so successful that other cable companies have been licensed to use the same construction. The main applications are for portable power cable, for aerial distribution lines, and for heavy power cable wherever voltage discharge will cause damaging corona and television interference.

The safety features of the grounded tape make PS Shielded Cable ideal for use in mines and other hazardous locations. PS Shielding has been applied to both single and multiple conductor cables which are sheathed to meet various applications. Write for complete information.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

American Electrical Wire and Cable

UNITED STATES STEEL

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Johnny's "Short Cut" takes 3,000 kilowatts now!

. . . just an old field on the edge of town. A few years ago, Johnny saved ten minutes getting home. Now his favorite short cut proudly displays 400 new homes.

Are you prepared to economically handle this new load?

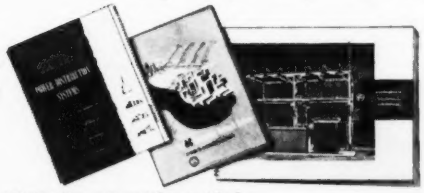
Sure, it's difficult to predict such future loads . . . BUT you can *plan* for them! For the first time in a good many years, you have a *real* opportunity to rebuild and simplify your system.

This doesn't mean you have to scrap your present equipment. It does mean that replacements and extensions should be made with a *modern system plan* in mind. Its flexibility meets *future* requirements. System planning actually means *less equipment* . . . but *better co-ordinated equipment.*

How can Westinghouse help you in this problem?

We can assist you in your *system planning.* Our engineers have worked with utility engineers throughout the country. Together, we have solved power distribution problems of all kinds and we have learned to *plan* systems and co-ordinate *all* distribution apparatus.

Our complete facilities . . . engineers, calculating boards, service organization . . . are all available to help *you.* May we be of help in your *system planning?* Call your nearest Westinghouse office or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. J-97138



YOUR "Know-How" Put to Work

One of the many ways in which Westinghouse can help you in your problem is to crystallize and formulate the best thinking on *system planning.* Here are three outstanding books to help you:

"Electric Utility Power Distribution Systems", B-3905—explains and classifies typical systems for *all* types of areas.

"Co-ordinated Substations", B-4061—presents a complete standardized line of substations, designed and manufactured to answer any *system* requirement.

"A-C Secondary Network Systems", B-4002—is the complete story of a system that has saved the utilities at least $175,000,000.

ASK FOR A PRESENTATION OF THIS VALUABLE INFORMATION

Westinghouse

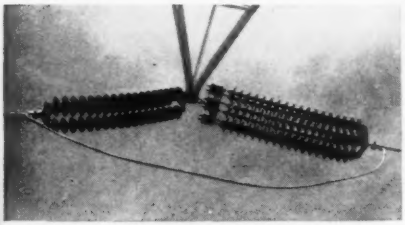
SYSTEM PLANNING SERVICE

BTC

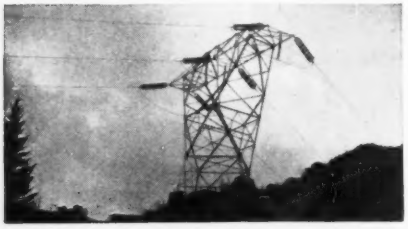
FORGED STEEL HI-LINE HARDWARE

Used on Another Important Transmission Line

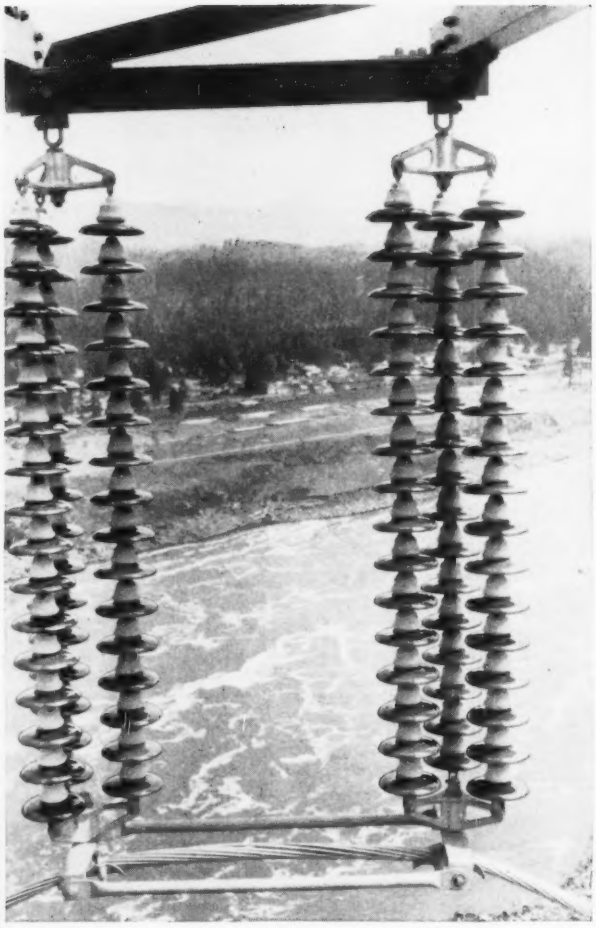
Sold only through your insulator manufacturer



Conductor dead-ending at Bradford Island Crossing was through Six-String Strain Yoke Sets using springs to equalize Insulator String tension. Triple Strain Yoke Sets were used on the inland side of towers.



One of the Dead-End Towers showing Triple Strain Yoke Sets and Jumper Suspension Strings.



The suspension construction at Bradford Island Crossing used two high strength forged steel clamps each connected to Yoked Triple Insulator Strings.

The Bonneville-Vancouver line is but one link in the Bonneville Power Administration's extensive transmission line network which has been an important factor in the development of the Pacific Northwest.

This 230 kv. line, built in 1939, is 35.6 miles long. The conductor, except for the river crossing described below, is 795,000 cm. A.C.S.R., supported, at 12750 pounds tension, on steel structures. At the Bradford Island Columbia River Crossing the special 801,900 cm. A.C.S.R., under 26,000 pounds tension, is suspended on high river-bank towers and dead-ended on next adjacent inland towers.

All Suspension Clamps, Strain Yoke Sets, and Fittings by BTC. Service record has been very satisfactory.

THE BREWER-TITCHENER CORPORATION, CORTLAND, NEW YORK

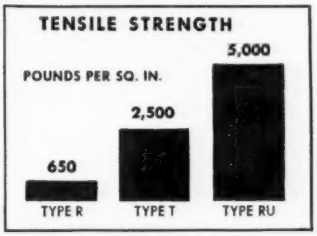
"HE PUTS 2 WIRES IN FOR EVERY 1 HE TAKES OUT...WITH Laytex® RU!"

Laytex permits more wires per conduit because it is America's smallest diameter, lightest weight, natural rubber covered branch circuit wire. U. S. Rubber Company's unique dip method applies 90% pure rubber to the conductors, eliminating the usual bulkiness and weight. Electricians on rewiring jobs will tell you that they can put eleven No. 14 Laytex Type RU wires into a conduit that holds only six No. 14 Type R wires. Moreover, they can use the same conduit—no need to rip it out.

Laytex RU is easier to pull through the conduit, because of a special wax finish. In a laboratory test, only 22 to 26 pounds pull was needed to draw Laytex through the conduit—as compared with 32, 30, 42, 45, and 80 pounds, respectively, for 5 other leading brands. That means Laytex is 33% to 300% easier to pull.

Six No. 14 Type R wires fit in ordinary conduit
Eleven No. 14 Laytex Type RU wires fit in same size conduit (Rewiring only)
MORE WIRES PER CONDUIT

Special tests by laboratory technicians reveal that Laytex RU insulation has a tensile strength of over 5000 pounds per square inch. This is because the insulation is made of 90% pure rubber, unmilled in order to preserve its high physical qualities.



Because the conductor leaves the liquid Laytex compound in a vertical direction, layers of Laytex of uniform thickness are formed around the conductor. This gives a wire that is perfectly centered and contains no thin spots.

Write for sample and booklet to Electrical Wire and Cable Department, United States Rubber Company, 1230 Avenue of the Americas, New York 20, N. Y.

RU wiring with **RU?**

A PRODUCT OF

U.S. RUBBER
SERVING THROUGH SCIENCE

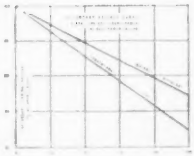
UNITED STATES RUBBER COMPANY

The inside story about

MOLONEY *HiperCore* DISTRIBUTION TRANSFORMERS

The inside story about Moloney HiperCore Transformers is centered around the material used in the cores. By using highly efficient oriented silicon steel it is possible to work the cores at higher flux densities than formerly. With the *total* flux requirements remaining practically unchanged, working the oriented steel at higher densities than practical with ordinary silicon steel, results in smaller cross-sectional areas of cores with a consequent reduction in weights.

The smaller cores permit the use of smaller windings, smaller tanks and less oil. This results in lighter weight and smaller transformers which are easier to install and handle generally, and take up less space on the poles. Reductions in size and weight have been made without sacrifice in all-around performance. In fact, HiperCore Transformer operating characteristics are better . . . voltage regulation has been improved . . . greater short-time overloads can be carried.

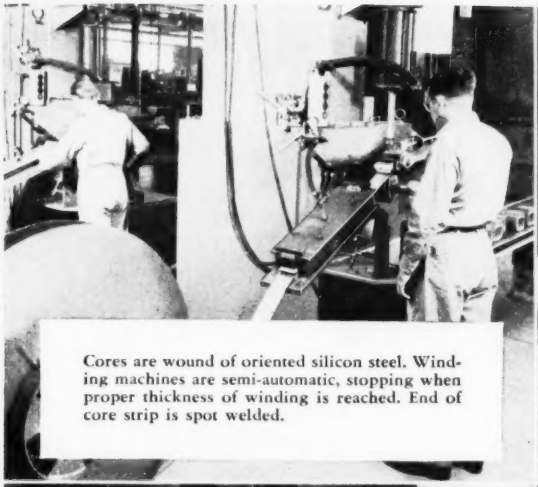


Illustrated are a few of the operations involved in the manufacture of HiperCore Transformers indicating the careful attention given to every detail in order to assure unexcelled on-the-job performance.

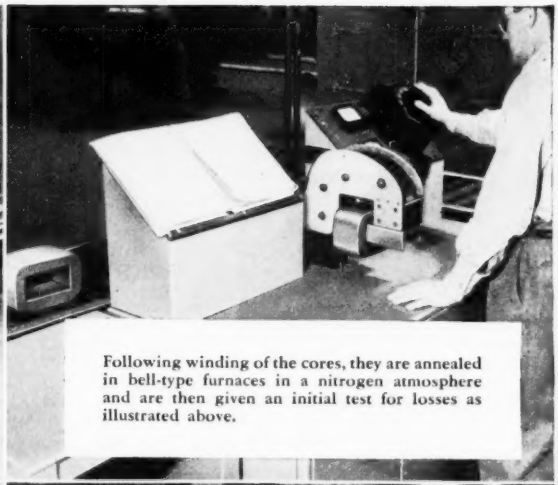
ME43-10

Testing voltage ratios at various tapchanger settings, to make certain that tap leads have been connected to proper studs, and that inter-coil connections are correct.

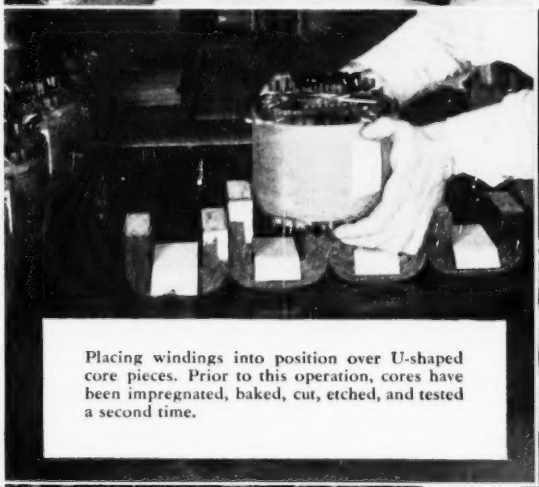
Placing core-and-coil assemblies in tanks after they have passed through oven which removes any moisture which may have been absorbed from the air, and also cures adhesive on core faces.



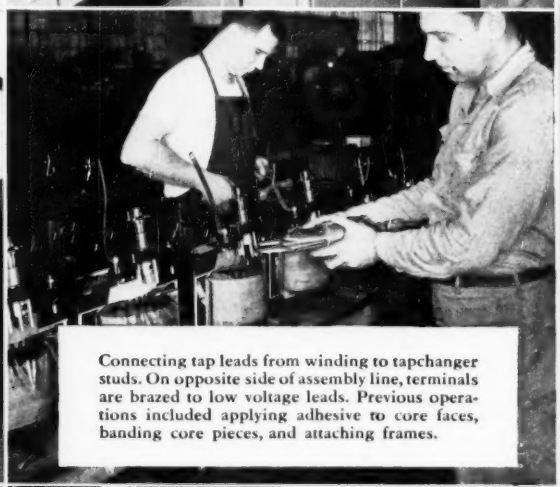
Cores are wound of oriented silicon steel. Winding machines are semi-automatic, stopping when proper thickness of winding is reached. End of core strip is spot welded.



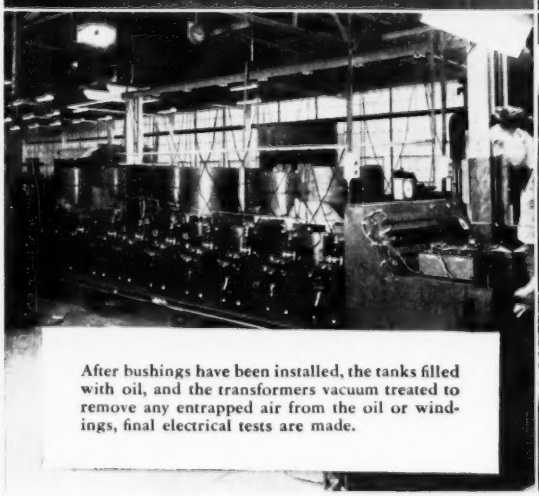
Following winding of the cores, they are annealed in bell-type furnaces in a nitrogen atmosphere and are then given an initial test for losses as illustrated above.



Placing windings into position over U-shaped core pieces. Prior to this operation, cores have been impregnated, baked, cut, etched, and tested a second time.



Connecting tap leads from winding to tapchanger studs. On opposite side of assembly line, terminals are brazed to low voltage leads. Previous operations included applying adhesive to core faces, banding core pieces, and attaching frames.



After bushings have been installed, the tanks filled with oil, and the transformers vacuum treated to remove any entrapped air from the oil or windings, final electrical tests are made.

MOLONEY
ELECTRIC CO.
Sales offices in all principal cities
FACTORIES AT ST. LOUIS 20, MO.
AND TORONTO, ONTARIO, CANADA

—that will remain a credit to your judgment in 20 years

The high quality of OLIVER Pole Line Materials is demonstrated in the length of service they provide. Because OLIVER products are properly designed, made from the best materials, and thoroughly protected against corrosion and weathering, they give the extra service that means long-range economy.

Specify OLIVER Pole Line Materials for greatest satisfaction—now and for life. You will never regret your choice!

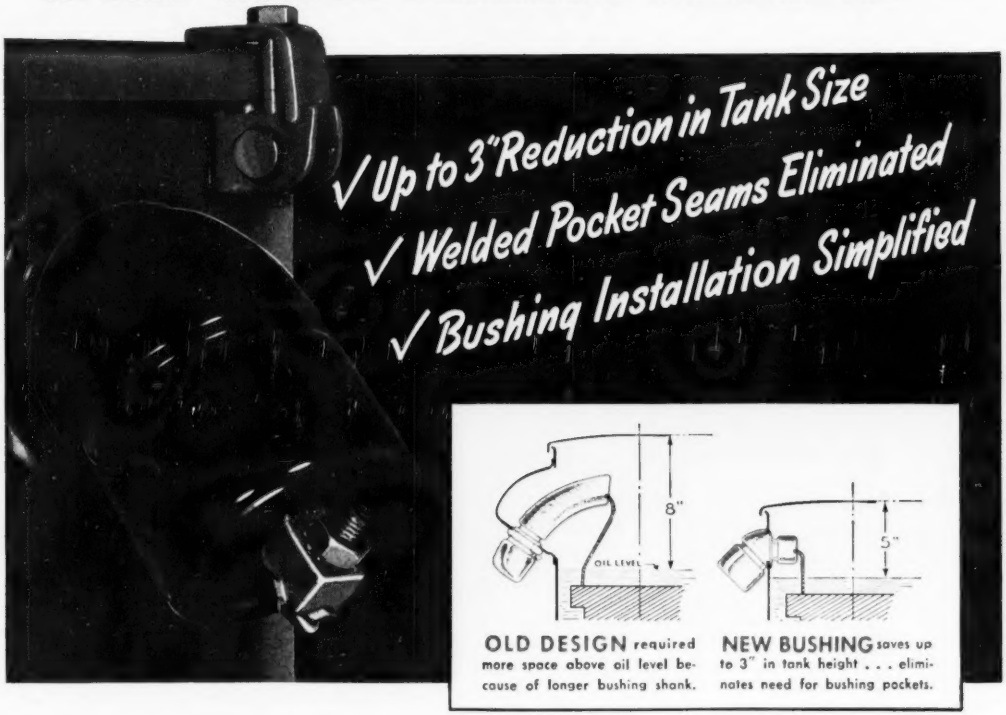
OLIVER
IRON AND STEEL
CORPORATION

South Tenth and Muriel Sts. Pittsburgh 3, Pennsylvania

ANNOUNCE

New Bushing

on Allis-Chalmers Distribution Transformers


✓ Up to 3" Reduction in Tank Size
✓ Welded Pocket Seams Eliminated
✓ Bushing Installation Simplified
8"
OIL LEVEL
5"
OLD DESIGN required more space above oil level because of longer bushing shank.
NEW BUSHING saves up to 3" in tank height . . . eliminates need for bushing pockets.

THIS NEW TANK WALL BUSHING reduces tank height as much as 3" . . . makes A-C distribution transformers smaller and easier handling than ever before!

Size reductions result from space-saving contour of the new bushing which eliminates need for high voltage bushing pockets. These reductions are *in addition* to savings already made through use of highly oriented electrical core steel.

A one-piece retaining ring holds the bushing in place. Bushing is simply adjusted by set screws. Critical porcelain tolerances between bushing and ring are eliminated.

Any shock ordinarily transferred to the bushing by a metal-to-porcelain contact is absorbed by a locking spring behind the retaining ring. Increased wall thickness, together with straighter, shorter shank contour, further increases mechanical strength of the bushing.

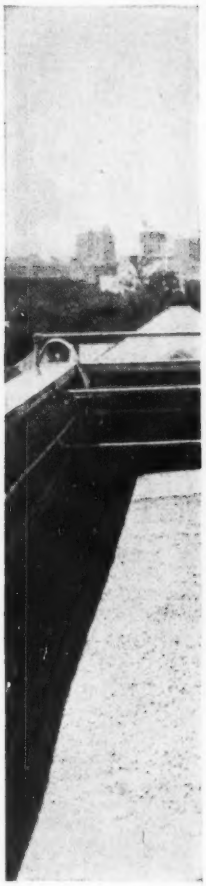
The new design is supplied in transformers from 3 to 100 kva, single phase, and from 9 to 150 kva, three phase, in voltages up to 4800/8320Y.

Contact your nearby A-C sales office for further details on this new bushing, or for other facts about Allis-Chalmers quality distribution transformers. A 2703

ALLIS-CHALMERS, 939A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products



"100,700 kvar in connected

Capacitors

equals 53% of our system peak load"

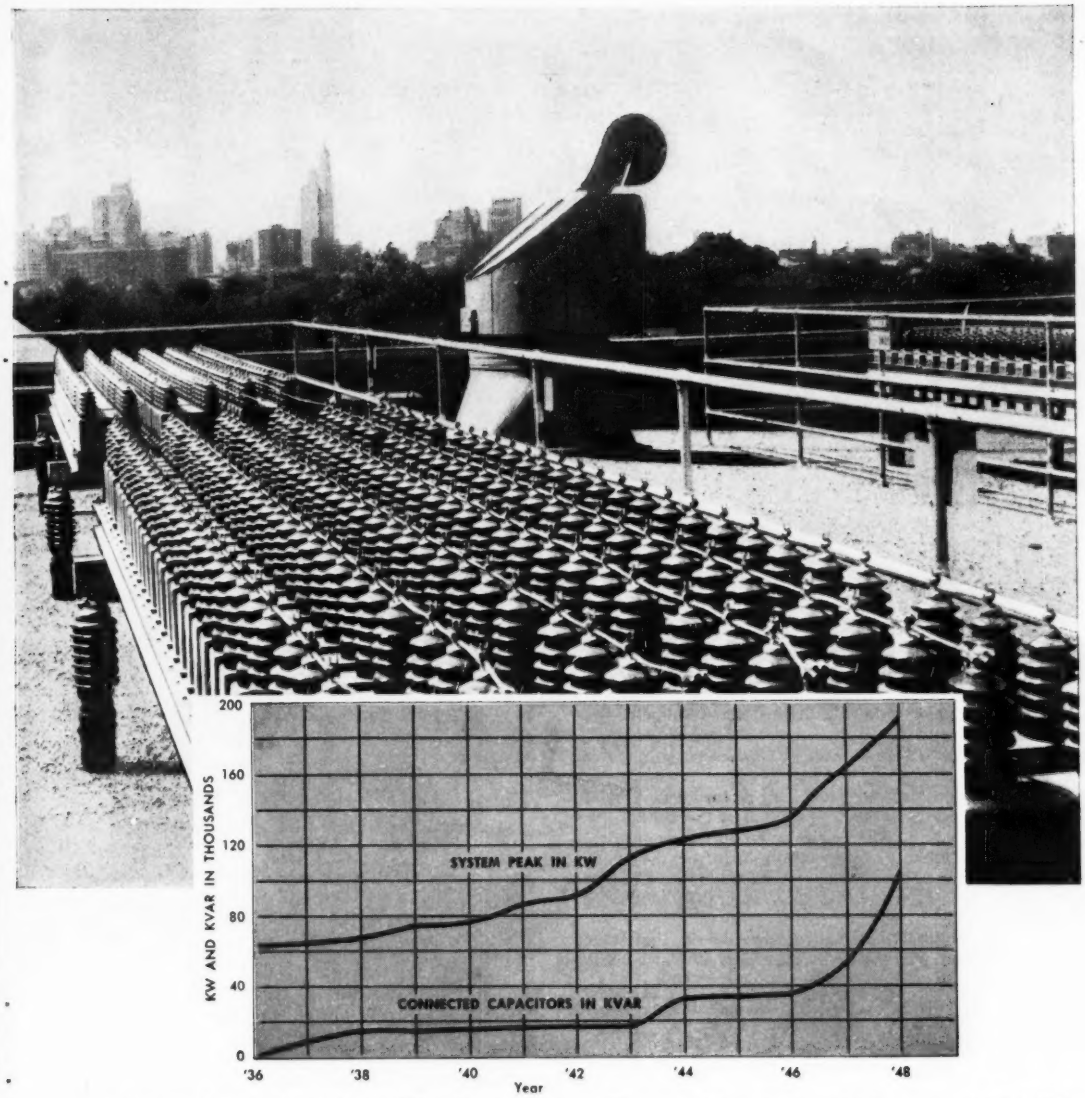
DALLAS POWER & LIGHT COMPANY

This is the story that Dallas Power & Light Company tells about capacitors:

"We have an unusual load problem in Dallas air conditioning. As an indication of its importance, our system peak load now occurs in the summer. It has been a major factor in the doubling of our peak load since 1942. And—introducing induction motors into office buildings, apartments, and even private residences—it has had a marked effect on the power factor of our system.

"As a result, kvar generation has become a major consideration with us. We doubled our kvar in installed capacitors in 1944, and we have tripled that figure in the last two years—until today, our 100,700 kvar in connected capacitors equals 53 per cent of our system peak load.

"Other central stations may find it of interest to note where and how we have used these capacitors: Approximately half of them (48,000 kvar, in round numbers) are installed as unswitched capacitors on our 4 kv and 13 kv overhead systems. A third (35,000 kvar) are installed as switched capacitors at our substations. About 16,000 kvar are installed on the



underground network, mostly as 230-volt capacitors, and 82 per cent of them switched. We have a little more than 1000 kvar, switched, connected to the 480-volt auxiliary bus of our steam-electric station. And finally, within the last few months, we have installed one hundred 3-kvar 240-volt capacitors on transformer secondaries in residential districts.

"Needless to say, capacitors are very important to us. We are submitting a chart which shows how our installations have increased— until now our kvar in capacitors exceeds our peak load of only six years ago."

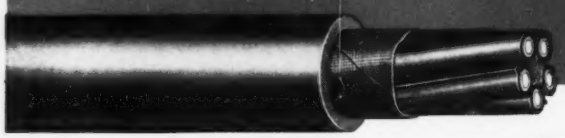
The purpose of these advertisements is to encourage electrical utilities to exchange information on the use of power-factor-improvement capacitors. We believe that such an exchange will best bring out that capacitors can be used much more widely than at present —that they provide the fastest way of increasing peak-load capacity —that they can bring many utilities extraordinary returns by increasing capacity of existing distribution lines, transmission lines, transformers and circuit breakers—and that they offer one of the best possibilities of scaling down system costs per kilowatt. If your experience with capacitors would be of interest and value to other companies, we would like to hear from you. Contact your G-E Representative or write *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

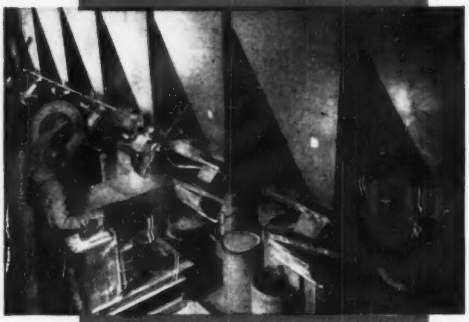
407-12

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

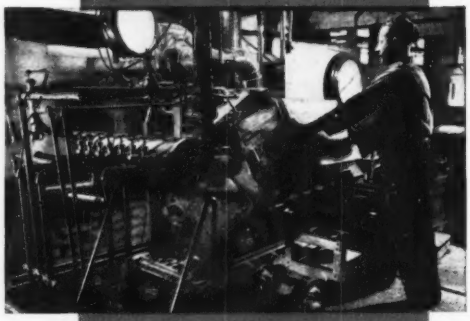
Okonite's basic formula for insulation forms basis for LONG CABLE LIFE



Up-River Fine Para Rubber



Balanced Mineral Ingredients



Mixed with 70 Years Experience

TODAY'S high installation and replacement costs tend to underscore the long term value of long-lived cable. And today, as always, no cable can be longer-lived than its insulation.

For 70 years, Okonite engineers have realized this. From the beginning they have adhered to the basic time-proved formula for Okonite rubber insulation. As a result, Okonite insulation remains the first choice of value-wise electrical engineers in the industrial, utility and transportation fields alike.

From the selection of the ingredients for the basic formula, through the processing and application of the finished insulation, the Okonite laboratories maintain close control at every step. For example, only natural rubber from the sturdy wild trees of the upper Amazon is permitted in the Okonite insulation. This is but one of the reasons for the long service records compiled by Okonite cables.

Note these typical examples of how Okonite insulation keeps its toughness and elasticity after long years in service:

Installation Conditions	Years In Service	Tensile Strength	Elongation 2" —
Honolulu, T. H. Communication Cable	32	1450	10.7"
New Haven, Conn. Substation Feeder Cable	30	1644	9.8"
New York, N. Y. Railroad Jumper Cable	24	1051	10.5"

If it's long-lived cable you want, specify Okonite time-tested rubber insulation as the basic component. And when you order an Okonite insulated cable, remember every length has been uniformly vulcanized in a continuous metal mold.

For further technical data, write for Research Publication WE-101 The Okonite Company, Passaic, New Jersey.

7211

OKONITE SINCE 1878 insulated wires and cables

THE BEST CABLE IS YOUR BEST POLICY

there are 6 good reasons for using MULTI-BREAKERS to build bigger, better, more profitable wiring jobs!

Reason #1 ... an Ever-Growing MARKET

Compare the electrical appliances available for today's home with those of only a few years ago! That's only the beginning—think of the ones to come! Home owners want these appliances and they need an electrical system that can handle them. That's where you come in.

Sell the Multi-breaker idea of complete circuit protection in addition to adequate wiring. That's the one way of preventing overloads, annoying service interruptions, and the nuisance of replacing burned-out parts. You are building the market for your services when you help your customer take full advantage of "electrical living" by installing Multi-breakers.

Would you like to know the five other reasons? Write the Square D Company, 4335 Valley Blvd., Los Angeles 32, California. We'll mail them, pronto.

SQUARE D's Thermal-Coilless Magnetic MULTI-BREAKERS

Give Complete Circuit Protection and Customer Satisfaction

...because they

—hold harmless momentary overloads but trip on continuous overcurrents before wire insulation is damaged.
—trip quickly on "shorts" to localize damage.
—give repeat protection. No parts burn out—nothing to replace.
—are non-tamperable. Factory test-tripped and sealed.
—are safe. No live parts exposed. Anyone can operate them.
—include switching means as well as circuit protection.
—are compact. Room for expansion without excessive space.
—are attractive. Can be installed in most convenient location.

SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

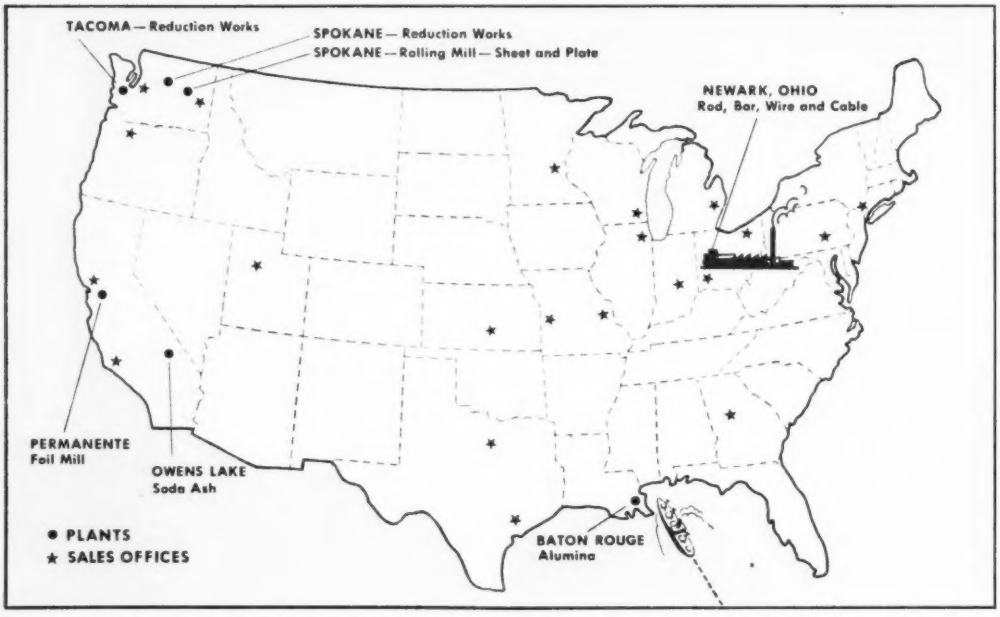
SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

Orders for Kaiser Aluminum Conductor now being confirmed

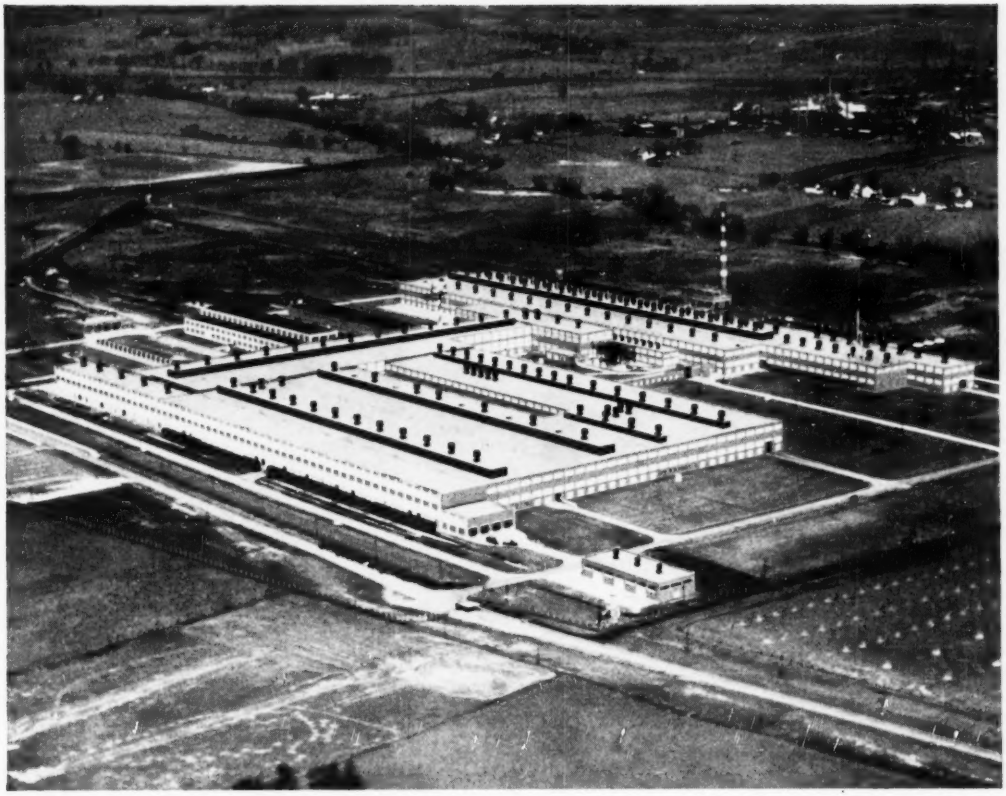
Through its nationwide sales organization and distribution outlets, Permanente Products Company is confirming orders for Kaiser Aluminum Cable and ACSR. Early delivery, according to schedule, is assured.

Two years of intensive engineering and manufacturing preparation has established Permanente Metals as a new, dependable source of aluminum conductor. And installation of new wire and cable production facilities by Permanente Metals makes its Newark, Ohio, plant one of the most modern of its kind in the world. It is being manned by experienced, highly skilled personnel.

When you order Kaiser Aluminum conductor, you'll join thousands of U. S. manufacturers in other fields who look to Kaiser Aluminum for finest quality—and to Permanente Metals for a brand of service that has set high standards for dependability.



Completely integrated production facilities assure you of a dependable supply of Kaiser Aluminum conductor.



Permanente Metals' newest plant is this modern aluminum rod, bar, wire and cable mill at Newark, Ohio.

Sales offices and distributors nearby

Information and service is available from any of Permanente Products' 21 sales offices. If it is more convenient, call the nearest office of General Electric Supply Corporation or Westinghouse Electric Supply Company, national distributors of Kaiser Aluminum conductor.

Kaiser Aluminum Cable is available in a complete range of standard sizes and standard strandings: From 1,590,000 circular mills to No. 6 Awg ACSR and All Aluminum Cable.

Permanente Metals

PRODUCER OF

Kaiser Aluminum Cable

SOLD BY PERMANENTE PRODUCTS COMPANY, KAISER BLDG., OAKLAND 12, CALIFORNIA . . . WITH OFFICES IN:

Atlanta • Chicago • Cincinnati • Cleveland • Dallas • Detroit • Houston • Indianapolis • Kansas City • Los Angeles • Milwaukee
Minneapolis • New York • Oakland • Philadelphia • Portland, Ore. • Salt Lake City • Seattle • Spokane • St. Louis • Wichita

Also available through General Electric Supply Corporation and Westinghouse Electric Supply Company.

KYLE OIL SWITCHES

for manual or remote control of

shunt capacitors, street lights, airport lighting, flood and other outdoor lighting, many other uses

100 AMPS., 15,000 VOLTS

Kyle manual (type G) and remote control (type GR) oil switches are sturdy, dependable, and provide many features that make them preferred for a wide variety of light duty load-break operations.

Quick break . . . long contact life

Both the manual and motor driven switches provide quick-break operation. Double copper-tungsten contact tips are specially designed to minimize burning and pitting, assuring long life.

Both are light weight, easy to install, and their cost is moderate. They are safe to use. Mechanism is insulated from the tank. Head and operating handle are dead, the only live parts being the top bushing terminals.

Dependable Motor Drive

The type GR has a shaded pole motor with a 115 volt 60 cycle AC circuit with a selector switch to open and close the GR from a remote point. It may be operated manually if desired. The switch uses current only during the actual on or off operation. There are no magnets or coils requiring continuous current. Three single-phase type GR switches may be used to give simultaneous switching of three-phase circuits. Other than an annual oil change and inspection, these switches require no attention and give long, dependable operation within the recommended operating cycles.

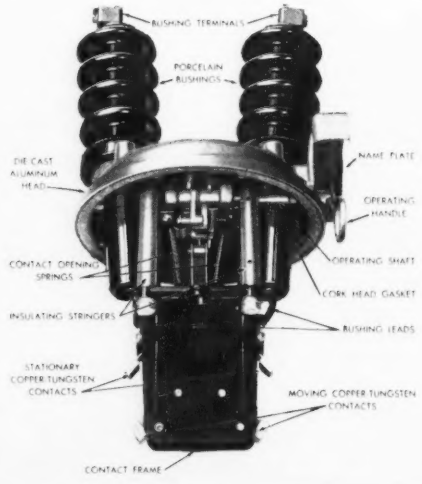
L-M'S COMPLETE OIL SWITCH LINE

Complete description, ratings, and dimensions in this handy Bulletin CR-2. Ask the L-M Field Engineer for a copy or write:

KYLE COMPANY
division of Line Material Company
Box 2077, Milwaukee 1, Wisconsin

Type GR Motor Driven Remote Control Switch

The manually operated type G looks the same except that it does not have the separately encased motor control mechanism shown on the left side. Total height, 18½"; tank 7⅛" diameter. Hangers for direct pole or cross-arm mounting.



7121

LINE MATERIAL Kyle Oil Switches

Complete Coordinated Equipment for All Distribution Requirements

JMB 854—A—4-13-49

KYLE

TYPE GS AUTOMATIC OIL SECTIONALIZER

Isolates permanent faults on branch lines of recloser-protected systems

Kyle automatic oil sectionalizers provide dependable automatic protection against permanent faults on branch lines. They do not open on temporary faults, but operate to disconnect the branch only after one, two, or three operations of the back-up recloser have failed to clear the fault. After the third recloser operation, the contacts of the sectionalizer open up while the recloser is open. Thus the faulted branch is disconnected, and the recloser resets itself and maintains service on the rest of the system.

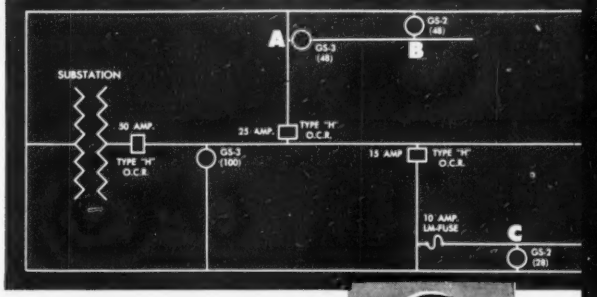
The sectionalizer may be set to open on a permanent fault after one, two, or three operations of the recloser, as desired. Since the sectionalizer does not interrupt short circuit currents, contacts last indefinitely, and there is no carbonization of the oil.

Get the whole story!

For details, dimensions, ratings, mountings, and a complete description of how Kyle type GS sectionalizers operate, ask the L-M Field Engineer for a copy of this Bulletin CR3, or write Kyle Company division of Line Material Co., Box 2077, Milwaukee 1, Wisconsin.

To Protect Your Lines with Kyle Type GS Sectionalizers

The diagram shows how it is done: *Point A* shows a sectionalizer set to open on the third recloser operation, indicated by GS-3. *Point B*: further sectionalizing by setting the sectionalizer to open on the second operation of recloser—indicated by GS-2. *Result*: a permanent fault beyond *B* causes sectionalizer GS-2 to lock out after second recloser operation; service is maintained on the branch protected by sectionalizer GS-3 at *A*. *Point C*: Sectionalizer GS-2 set to open on second recloser operation isolates a permanent fault before the back-up fuses are damaged or blown by the third operation of the recloser. Kyle Sectionalizers also will replace branch line fuses on systems protected by Kyle Type H Reclosers, giving you complete automatic protection.



HAS ALL THE KYLE SAFETY FEATURES

1
Tank, cover, and operating handle are dead. Tank may be grounded.

2
Mechanism cooled, and insulated from tank, by transformer oil.

3
Standard cover type bushings. Terminals are the only hot spots.

4
Trip-free operating handle.

RATINGS:

Seven sizes, with minimum tripping current 8 to 100 amps to coordinate with reclosers rated from 3 to 50 amps; maximum operating current 150 to 1200 amps; 2400 to 15,000 volts. Ratings may be changed by changing coils in the field. Weight with oil about 20 pounds. Crossarm or direct pole mounting hangers.

KYLE COMPANY

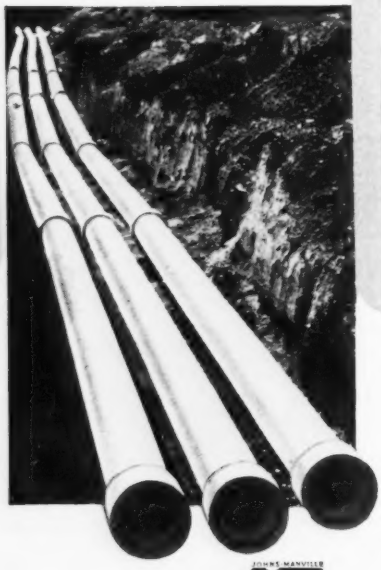
division of Line Material Company, Box 2077, Milwaukee 1, Wisconsin

7120

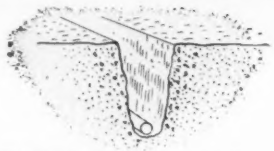
LINE MATERIAL Kyle Sectionalizers

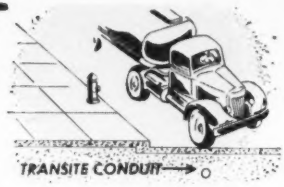
Complete Coordinated Equipment for All Distribution Requirements

Do you know these facts about TRANSITE DUCTS?



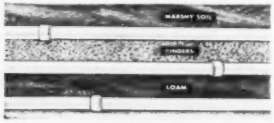
TRANSITE CONDUIT

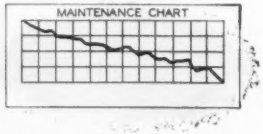




This durable duct is for use underground, or on exposed locations without a protective casing . . .

Under sustained earth loads and traffic pressure, it maintains its strength and true form . . .

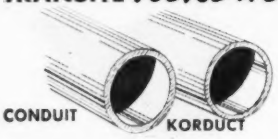


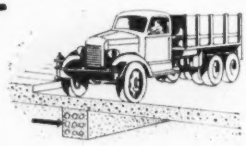


Transite Conduit effectively resists weather, smoke and fumes . . . is virtually unaffected by corrosive soils . . .

Its cost is low and, in service, it is much more economical than other materials of comparable strength and durability.

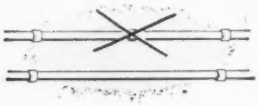
TRANSITE KORDUCT

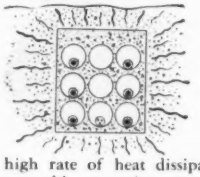




Thinner walled, lower priced than Transite Conduit, Transite Korduct is for use where an encasement is specified . . .

Because Korduct is incombustible, less concrete is required between ducts to provide the necessary degree of fire protection.





Its long lengths (10 feet) mean fewer joints, reducing the number of spacers required . . .

Its high rate of heat dissipation lowers cable operating temperatures . . . increases system capacity . . .

. . . *In addition,* both Transite Conduit and Transite Korduct have these characteristics:

1. INCOMBUSTIBLE—made of asbestos and cement, they cannot burn . . . will not contribute to the formation of dangerous smoke, fumes or gases.

2. IMMUNE TO ELECTROLYSIS—Transite Ducts are nonmetallic and inorganic . . . unaffected by electrolysis.

3. SMOOTH BORE—Making cable pulls easier, both at initial installation and after years of service.

4. EASILY INSTALLED—Lining up is fast and accurate because Transite Ducts combine lightweight, long lengths, simple assembly.

For details and specifications, write for Data Book DS-410, Johns-Manville, Box 290, New York 16, N. Y.

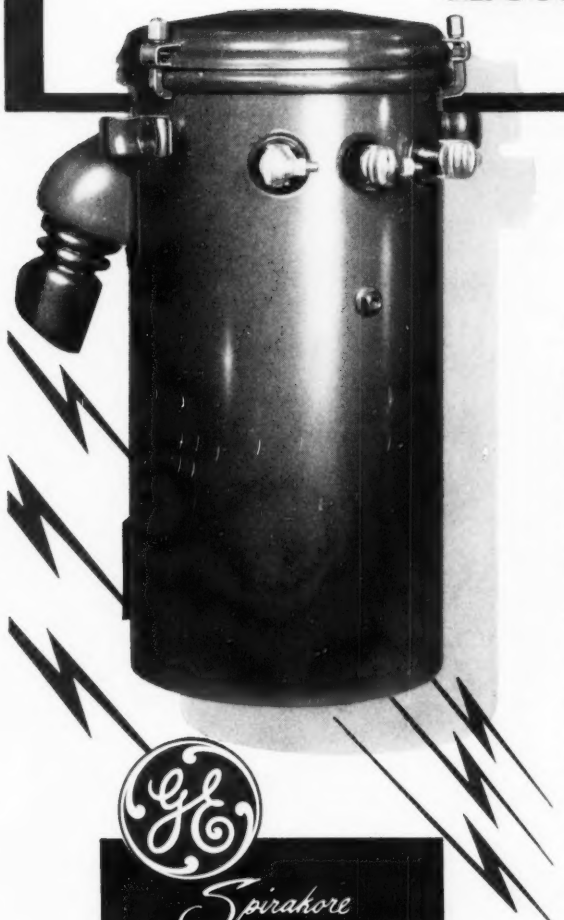
JOHNS MANVILLE JM PRODUCTS

Johns-Manville TRANSITE DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

Your own records will show what we've done about lightning



In the middle of 1943 our engineers made discoveries about impulse strength which led to changes in design of small, low- and medium-voltage distribution transformers. What these changes accomplished can be seen in *your* records.

If your experience is typical, roughly half of all distribution transformer failures can be charged to lightning. However—if your records are typical—on all Spirakore transformers delivered since late 1943, lightning failures have been almost insignificant.

One of Many Spirakore Advantages

Important as this increased impulse strength is, it is still only one of the advantages you get with General Electric distribution transformers. You get Spirakore design throughout the entire line of single-phase liquid-filled transformers—with its great savings in size and weight. You get improved clamping construction for greater mechanical strength. You get sealed tanks for longer oil life. You even get a new, better, synthetic-resin baked-on paint which improves appearance and reduces maintenance.

Spirakore Still Leads

Today—as ten years ago when lighter, smaller Spirakore transformers made history—Spirakore still leads the field—the finest distribution transformer we have ever made, the finest you can buy. Ask for Bulletins GEA-4885 and GEA-4521. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

Spirakore Transformers

GENERAL ELECTRIC

402-91

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Now LOCKE BRINGS

CASH IN ON RM*

Get started now by sending coupon for your RM* HANDYLOG today!

before you buy.. stop! see what LOCKE'S got...

YOU ITS HANDY, NEW RM* HANDYLOG

A valuable new money-saving, time-saving convenience for purchasers of power insulators and supension hardware

Lists...in just 32 pages...all the power insulators and suspension hardware products you need for handling over 95% of your jobs

Use coupon below to bring Locke's RM* HANDYLOG to your desk

Place the items you find in it on your standards list and you'll obtain five important advantages—

1. YOU SIMPLIFY STOCKS and stocking operations because RM items . . . by having the ability to do a number of jobs equally well . . . should enable you to reduce your stocks to a new low.
2. YOU PAY LOWEST PRICES for RM items because they are all standard items . . . produced in large quantities.
3. YOU GET PROMPT SERVICE on RM items because they're always carried in stock by your Locke Regional or Distributors warehouse.
4. YOU GET FAST DELIVERY on RM items because they are always being produced . . . always on hand for immediate shipment from the factory.
5. YOU REDUCE CHANCES OF OBSOLESCENCE using RM items because their assured availability allows you to match future extensions to present construction.

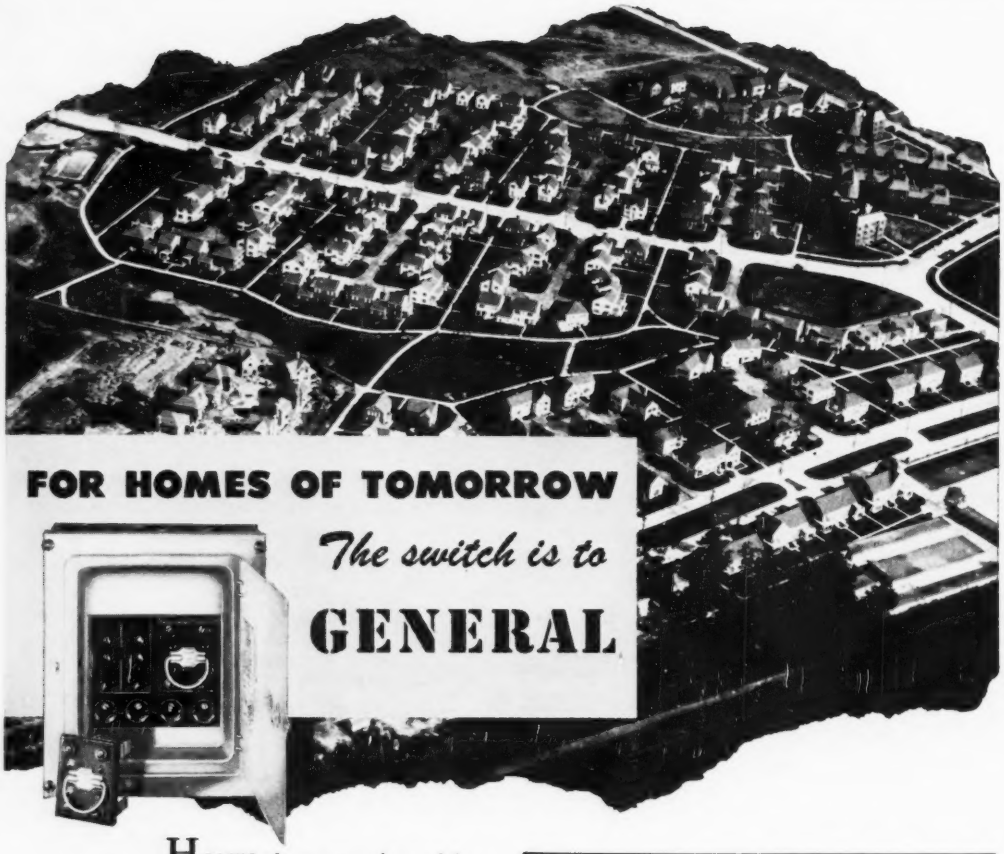
*RM (Repetitive Manufacture)
A Program designed to help reduce the installed cost per kilowatt on line and station equipment.

LOCKE
INCORPORATED
BALTIMORE, MARYLAND

LOCKE INCORPORATED • BALTIMORE, MARYLAND
MAIL THIS COUPON FOR YOUR RM* HANDYLOG

Name _____
Title _____
Company _____
Address _____
_____

before you buy.. stop! see what LOCKE'S got...



FOR HOMES OF TOMORROW

The switch is to

GENERAL

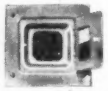
HOMES of tomorrow demand the best of today! That's why more and more electrical contractors—builders—architects—and wholesalers are switching to GENERAL!

GENERAL SWITCH CORP. specializes in the construction of Safety Switches, Service Entrance Equipment, Branch-Circuit or Residence Panels, Panelboards for Light and Power Distribution . . . for luxury type and low-cost housing projects. Safety Switches available from 30 through 1200 AMP.—250 V. and 600 V.—Type A, C and D—indoor and outdoor—horsepower rated.

Wherever quality—safety—convenience—endurance—trouble-free performance—ease of installation—and low maintenance costs are the first consideration, *the switch is to* GENERAL!

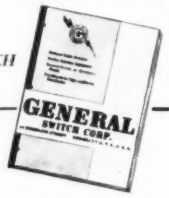
GENERAL MAIN AND RANGE COMBINATION. (Cat. No. 6214, surface or flush.) The most economical switch for range installations. Double pullout switch with one 60 AMP main and one 60 AMP range switch in series (also parallel). 4 lighting circuits (6 and 8 also available). Has 60 AMP sub-feed pressure wire connectors for water heater or other 220 V. circuits.

GENERAL EXTERNALLY OPERATED SAFETY SWITCH. (Cat. No. 1003N.) 100 AMP., 3 pole, 2 fuse switch with solid neutral. Knife blade construction. Plastic composition base. Quick-Break. Ample space for wiring.



GENERAL PLUG FUSE BRANCH-CIRCUIT or RESIDENCE PANEL. (Cat. No. 104, surface or flush.) Available up to 32 circuits. Flush spring catch.

Ask your wholesaler or write today for the GENERAL SWITCH 68-page catalog.



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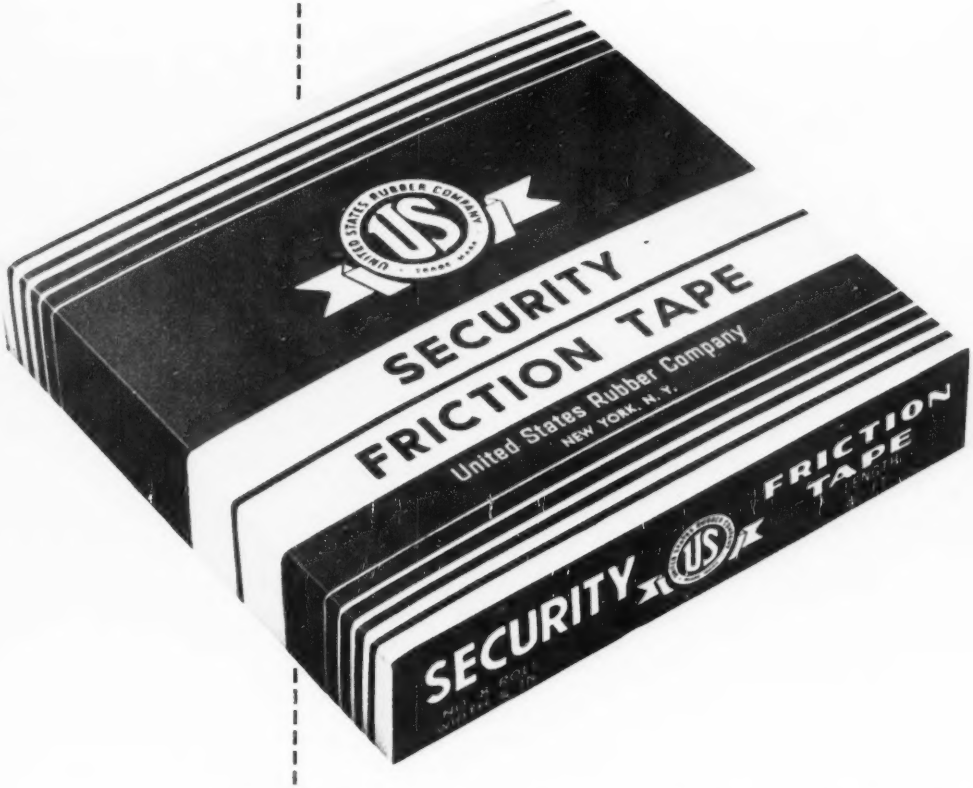
A SAFE AND STEADY SELLER



"SECURITY"—THE FRICTION TAPE MADE BY

Instinctively—electrical contractors reach out for things they know and trust.

They trust "Security" because they *know* it stands up in service. It has high tensile strength. It is free of pin holes. It does not unravel when unwound from the roll. It tears straight. And it has a strong, rubbery adhesive that sticks and *holds.*

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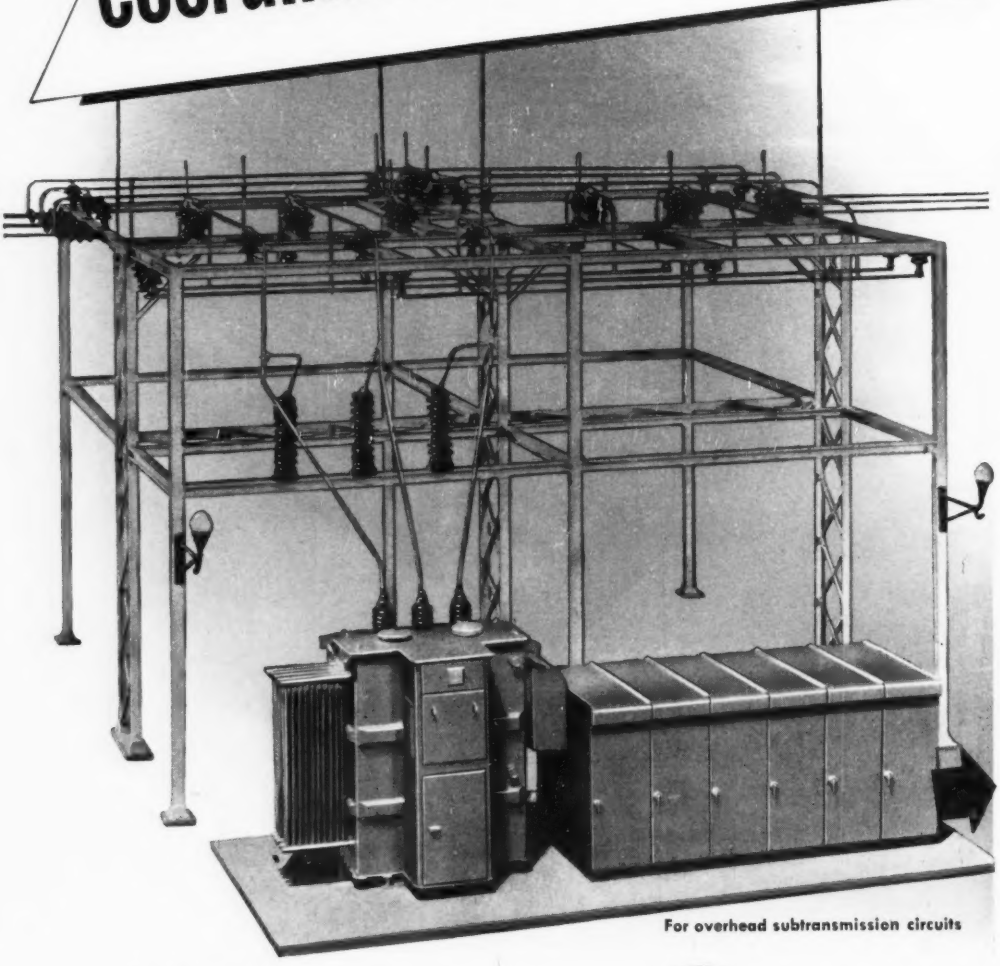
UNITED STATES RUBBER COMPANY

Which meets your system requirements?

coordinated substations?



For overhead subtransmission circuits

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

MODERN EQUIPMENT FOR BETTER DISTRIBUTION SYSTEMS

. . . . unit substations?

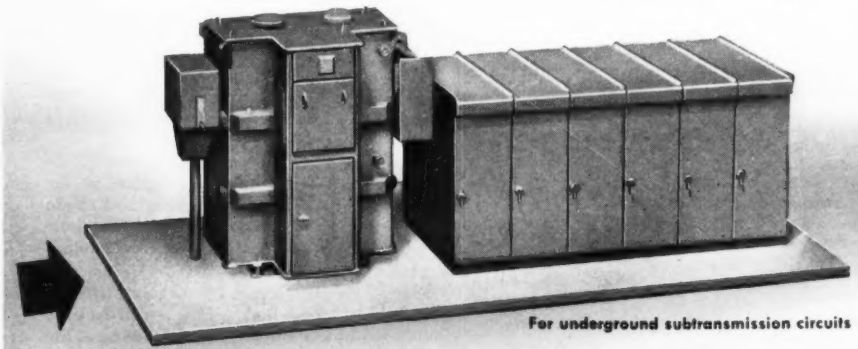
Today, *modern* substations for any system requirement may be purchased in two basic forms . . . as *Unit Substations* or *Coordinated Substations* . . . both supplied by Westinghouse.

Westinghouse helped introduce the *Unit Substation.* This type of substation is designed, built, tested and shipped complete . . . ready for connection to your system. Briefly, a *Unit Substation* consists of a transformer, and the necessary switchgear, combined to form an articulated unit to which the subtransmission and primary feeder circuits can be directly connected.

The *Coordinated Substation* consists of one or more *Unit Substations* with complete overhead terminating structure and any necessary terminating facilities. This equipment is shipped in easily-installed, factory-assembled and prefabricated sections.

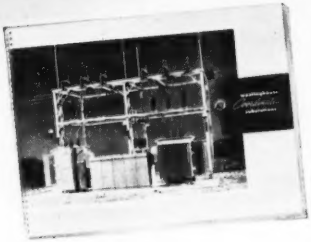
Westinghouse can supply a complete substation in *any* form . . . from incoming line to outgoing feeder . . . for *any* system. Whatever your power distribution requirements may be . . .

YOU CAN BE **SURE**
IF IT'S Westinghouse



For underground subtransmission circuits

Here's the Complete Story **ON WESTINGHOUSE COORDINATED SUBSTATIONS!**



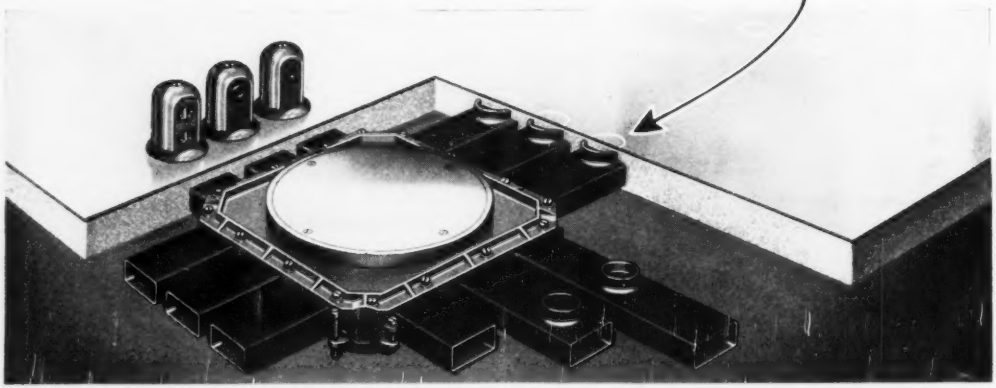
This 86-page book presents the standardized Westinghouse line of Coordinated Substations. Fact-filled pages of photographs and line diagrams give you complete information on all types . . . covering all basic requirements from the simplest to the more involved types of distribution substations.

To get your copy, call your nearest Westinghouse office. Ask for booklet B-4061 or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

J-97132

New GENERAL PETROLEUM BUILDING has..... 50,000

electrical convenience outlets at the floor surface!



REASONS *WHY* NEPCODUCT was selected:

- **Simplicity and standardization of parts.**
- **Harmonizes with other building operations.**
- **Grounding and shielding characteristics.**
- **Convenience of quickly established service connections for telephone, communications, power and lighting.**

"We recommend and install Nepcoduct," states Mr. R. R. Jones, electrical contractor. "We are sold on the quality and the manner of its fabrication—its ease of installation with efficiencies appealing to the pride of labor."

R. R. JONES, R. R. Jones Electric Co., South Pasadena, California

NEPCODUCT—the steel underfloor distribution system provides electrical convenience outlets throughout the monumental General Petroleum Building.

This new building will never grow old—electrically—for there are convenience outlets at the floor surface to take care of present and future requirements for lighting and power, telephone and signal services to desks and free-standing equipment.

National Electric Nepcoduct fits *any type* of floor construction—cellular steel . . . steel deck . . . metal form . . . monolith . . . junior beam . . . tile arch . . . wood. Outlets, spaced every 24", threaded 1½" pipe size, are *located at the floor surface.* This greatly reduces the time and cost required to install service fittings.

Let us send you installation and engineering data on Nepcoduct.

Steel for Permanence . . .
Grounded for Safety

National Electric Products Corporation

1308 CHAMBER OF COMMERCE BUILDING
PITTSBURGH 19, PA.

How attractive can a Substation be?

Maybe you've hesitated to take advantage of the many benefits of locating your substations close to the load because you were afraid of the reaction of placing substations in residential districts.

Other utilities felt the same way too, until they investigated the advantages of G-E unit substations outlined by our engineers.

They were told that substations literally can be "dropped" in anywhere on the system to take care of present and future load demands.

And with a little incidental landscaping, the substations became an inconspicuous part of the community.

We'd like to show you more examples of how other utilities integrated G-E unit substations into their planning. We'd also like to tell you about the many advantages—such as lower costs and increased reliability—of G-E load center power distribution. Give us a call at the office, or write for brochure GEA-5155 that shows how other utilities took advantage of G-E engineering and service. *Apparatus Department, General Electric Co., Schenectady 5, N. Y.*

GENERAL ELECTRIC

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

Cole Electric Co.

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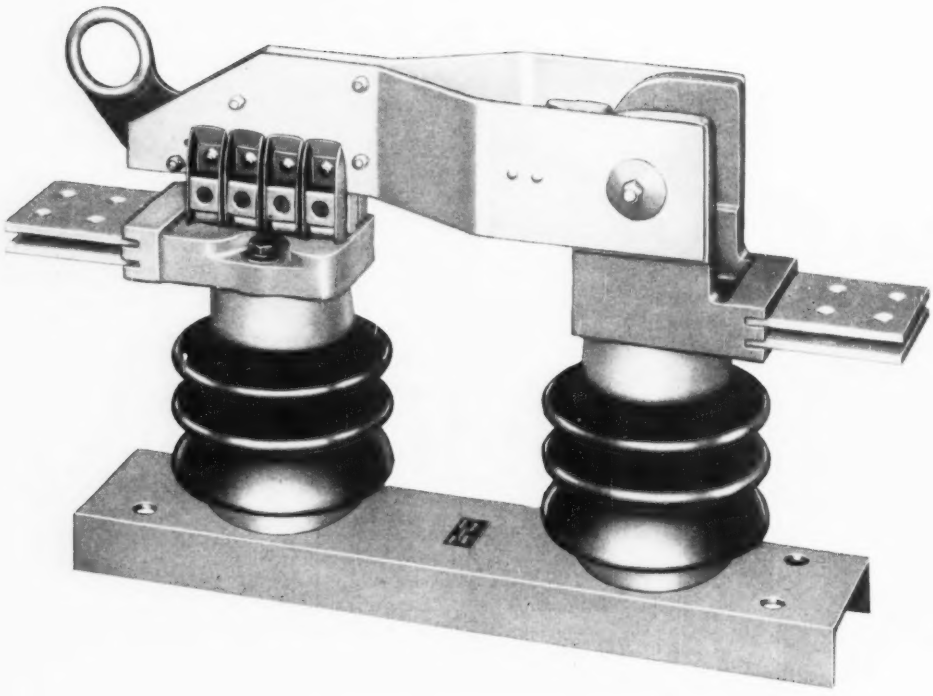


OUTDOOR HOOK STICK
DISCONNECTING SWITCH
Single Pole—Single Throw
7500 Volts—1200 Amperes
Type Y2 (Special Terminals)
See Bulletin 28

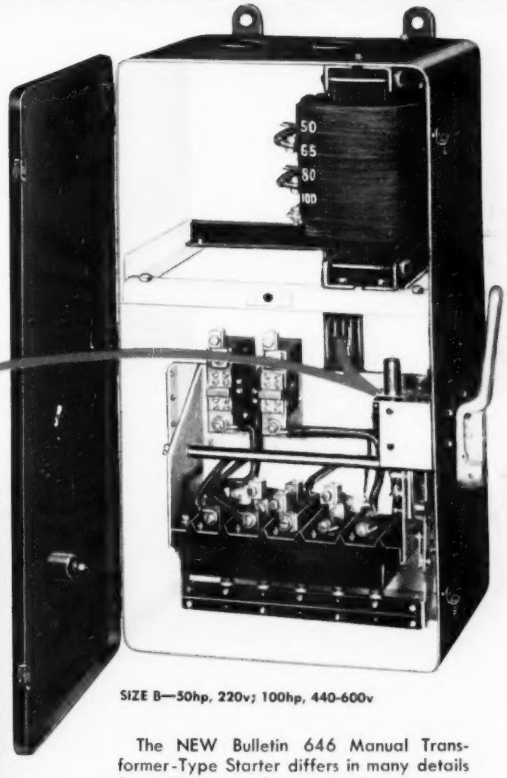
NEW

Bulletin 646

Manual Transformer-Type Reduced-Voltage Starter

Here is the first outstanding improvement in manual transformer-type starters in twenty-five years. It is a worthy addition to the Allen-Bradley line of motor controls.

An unusual feature is its adjustable time delay, which prevents careless operators from switching the motor too quickly to full running voltage. Many other features are described on the next page.



SIZE B—50hp, 220v; 100hp, 440-600v

The NEW Bulletin 646 Manual Transformer-Type Starter differs in many details from older types of reduced-voltage starters.

Time-tested developments . . . like Allen-Bradley double break, silver alloy contacts . . . assure long, trouble-free service. See next page for further details.

Allen-Bradley Co., 1316 S. Second Street, Milwaukee 4, Wis.

ALLEN-BRADLEY

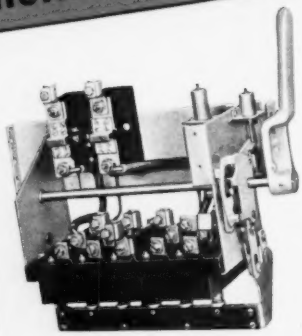
BULLETIN 646 TRANSFORMER-TYPE STARTER

QUALITY

TURN
see next page

EXCEPTIONAL FEATURES *of the*

Bulletin 646 Manual Transformer-Type Starter



TIME DELAY SWITCHOVER

The Bulletin 646 switching mechanism is a simple, mechanical linkage operated by a two-position, manual starting lever. When the lever is pulled forward, the switch mechanism moves the contacts into the "Start" position. This permits the motor to accelerate at reduced voltage.

An interlock, under dashpot control, prevents the starting lever from being thrown into the "Run" position until the motor has accelerated for several seconds. This timing is adjustable to suit varied starting conditions.

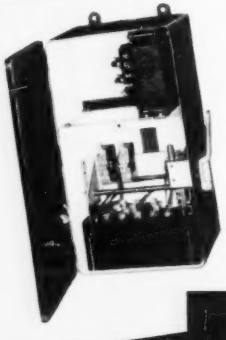
No-voltage protection is also provided by a magnetically operated hold-in latch. Man, motor, and machine are fully protected against accidents and damage from line failures.

DEPENDABLE OVERLOAD RELAYS

The accurate, reliable overload relays operate on the soldered ratchet principle. They remain reliable in operation, even after long inactivity. Thermal elements available for any load. Contacts are pure silver.

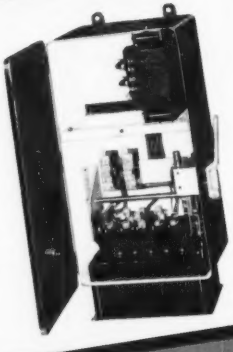
DOUBLE BREAK, SILVER ALLOY CONTACTS

Starting and running contacts are mounted in a molded contact block. Double break, movable contacts are attached to copper spanners, spring-mounted on an insulated rocker arm. In the starting position, the movable contacts bridge the motor and reduced voltage contacts. In the running position, they bridge the motor and line voltage contacts. Easily accessible for inspection.



CAN BE SUPPLIED WITH OIL-IMMERSED CONTACTS

For installations requiring oil-immersed contacts, Bulletin 646 Transformer-Type Starters can be supplied with an oil tank, inserted through the bottom of the enclosure. The tank is suspended on threaded studs, which serve as hangers when the tank is lowered. Since contacts immersed in oil deteriorate much more rapidly than when operated in air, air-break starters are preferable for most applications.



Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wis.

TURN
see front page

Send for Bulletin 646

ALLEN-BRADLEY

Reduced-Voltage Starters for Squirrel-Cage Motors

QUALITY

Tops IN THE MILE-HIGH LEAGUE!

● The Public Service Company of Colorado handles electricity and gas distribution and transmission for its customers in the mountainous north-central portion of the state. For maintenance work, for readings, for "cutting in" new equipment in inaccessible areas where other means of communication are not available, the company finds G-E radio an indispensable, money-saving tool.

This utility's trouble trucks, line trucks, patrol vehicles and compressors, as well as supervisors' cars are in touch with one another and with headquarters at Denver by radio.

J. M. Wissenbach, Engineering Department, shown above, reports that dispatching by G-E radio *materially cuts elapsed time between receipt of complaint and adjustment of trouble.*

General Electric specializes in radio communication systems for utilities faced with difficult problems of terrain or weather. For complete information call the G-E office nearest you or write: *General Electric Company, Box 1122, Electronics Park, Syracuse, New York.*

Before You Select Any Radio Communication Equipment—

Get This Bulletin FREE!

Colorful booklet about General Electric radio communication will be sent to you on request. Ask for it.

You, too, can put your confidence in—

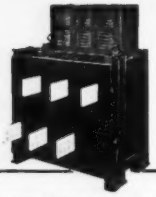
GENERAL ELECTRIC

NEW AIR-COOLED
DISTRIBUTION TRANSFORMERS

POLE MOUNTED — OUTDOOR — ALL-PURPOSE — INDOOR — WALL MOUNTED

LIGHTER! SMALLER! SAFER! MORE ECONOMICAL!

MARCUS SCORES AGAIN IN THE FIELD OF AIR COOLED TRANSFORMERS



AIR-COOLED TRANSFORMERS
1 to 2,000 KVA up to 15,000 Volts to meet Individual Requirements

- DISTRIBUTION
- GENERAL PURPOSE
- PHASE CHANGING
- ELECTRIC FURNACE
- RECTIFIER
- WELDING
- MOTOR STARTING

From a Pioneer in the field comes a new distribution transformer—AIR COOLED, DRY TYPE. No hazardous oil or toxic liquids to fuss or bother with. The use of superior class B and C heatproof insulation such as fibre-glass, mica, porcelain, new Johns-Manville Quinterra and similar inorganic material results in a transformer that can withstand the overloads that normally would damage an ordinary class A (cotton and paper) insulated oil filled unit. The entire transformer element is seal protected against oil, acids, moisture, etc., and is housed in a sturdy, scientifically ventilated, weatherproof case which conforms with all applicable EEI-NEMA construction standards. This extremely versatile transformer can be used outdoors, pole or platform mounted or indoors at the load center, mounted wherever convenient with no expensive fireproof vault required.

Currently available in sizes to 100 KVA, voltages to 5000 V.

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40 MONTGOMERY STREET
HILLSIDE 5, NEW JERSEY

PIONEERS IN THE FIELD OF AIR-COOLED TRANSFORMERS

ELECTRICAL BOOKS

MICROWAVES AND RADAR ELECTRONICS, by Ernest C. Pollard and Julian M. Sturtevant, 425 pages, 6x9. John Wiley & Sons, $5. Considers developments arising chiefly from the microwave radar program. Necessary facts about microwave circuits are developed on the basis of electricity and magnetism. Pulse circuits are considered as a unified subject. A postwar work with emphasis placed on problems arising since the end of the war. Attention has been devoted to applications of microwave and radar electronic techniques considered in various scientific periodicals since the war's end. No extensive background in communications or electronics is required for use of the book.

ELECTRONIC TIME MEASUREMENTS, MIT Radiation Laboratory Series No. 20, edited by Britton Chance, Robert I. Hulsizer, Edward F. MacNichol and Frederick C. Williams, 528 pages, 6x9. McGraw-Hill Book Co., $7. Surveys use of precision timing methods in distance finding with detailed designs of precision ranging circuits depending upon manual and automatic control. Second part treats electrical circuits using supersonic delay elements for the cancellation of recurrent waveforms as used in moving target indication systems. Third part presents several precision methods for data transmission employing pulse timing techniques.

INDUSTRIAL ELECTRONICS HANDBOOK, by electronic engineers of the Westinghouse Electric Corp., 680 pages, 9x12. John Wiley & Sons, $7.50. Presents basic theory and principles of industrial electronics; covers basic theory of electrons and the design, application and maintenance of electronic equipment in industry. Presents underlying theories and design factors; brings the electrical engineer up to date on developments in electronic instruments, motor control, dielectric heating of woods and plastics, resistance welding, X-ray and photoelectric devices and many other fields of electronics.

FUNDAMENTALS OF ELECTRIC WAVES, second edition, by Hugh Hildreth Skilling, 245 pages, 6x9. McGraw-Hill Book Co., $4. A lucid explanation of electromagnetic theory stressing physical interpretations and practical application. Contains further material on both theory and application of electric waves; changes in units and notation to agree with best usage in recent publications are made. Contains much added material; a rewriting of some sections; representation of many subjects, and addition of many more problems to illustrate text.

HANDBOOK OF INDUSTRIAL ELECTRONIC CIRCUITS, by John Markus and Vin Zeluff, 272 pages, 9x11. McGraw-Hill Book Co., $6.50. Gives 433 practical electronic circuits with discussion of each, its performance characteristics and industrial application. Values of important components are included to facilitate conversion of the theoretical circuit to actual practice. Original source of circuits is given and index is designed for quick use. Circuits reflect intensive research in hundreds of magazines and periodicals and represent the work of leading men in the field.

SAY "RoFlex" AND SAVE

Yes, you will save both time and installation costs by asking for . . . and insisting upon . . . this new superior Rome non-metallic sheathed cable. It is "easy to work" and is a quality product, manufactured for safe and trouble-free electrical circuits.

These RoFlex features assure you of the utmost in workability and dependable quality:

STRIPS EASILY

1. The thermoplastic insulated conductors *strip easily,* leaving bright, clean copper for quick connection. The insulation is highly resistant to oils, acids, moisture and flame . . . is permanently colored for quick and easy circuit identification

DURABLE PROTECTION

2. A spiral wrap of specially treated paper covering each conductor provides light-weight, *durable protection* against mechanical injury . . . yet, strips back easily.

LONGITUDINAL STRENGTH

3. Impregnated jute fillers in each valley give the finished cable increased *longitudinal strength,* and serve as a "rip-cord" for stripping the outer braid.

FLAME AND MOISTURE RESISTANT

4. The outer cotton braid is *flame and moisture resistant.* The uniformly small diameter saves space in outlet boxes and fits smaller holes.

Underwriters' Approved for 60° C operation under the '47 National Electrical Code.

Again, we say, there are good reasons why you should insist upon RoFlex. It means to you . . . easier stripping, lighter weight, uniformly small diameters, cleaner handling, and dependable quality . . . in short, a profitable job for you and long-lasting satisfaction for your customer.

REMEMBER THE NAME ROFLEX. LOOK FOR IT ON EVERY CARTON

ADEQUATE WIRING SERVES AND SAVES

FROM BAR TO FINISHED WIRE

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THE MAGNO-TRONIC FLUORESCENT STARTER

PROTECTS Fully automatic thermal relay with unusually long life that eliminates blinking lights and protects all auxiliary equipment.

SIMPLIFIES Replacement of worn-out lamp automatically restores closed circuit—replacement of starter unnecessary. No button to push.

REDUCES COSTS Magno-Tronic starters provide exact timing in the lamp electrode—preheating process preventing excessive loss of emission material thereby assuring the maximum in the useful life of a lamp. The established quality of this starter saves considerable time in maintenance and man hours required to repair and/or replace an inoperative lighting unit.

VERSATILE Will operate efficiently over an extended voltage under widely varying temperatures.

GUARANTEED FOR ONE YEAR

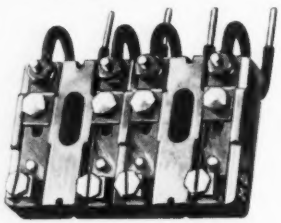
The (SP-15-20) for use with either 15 or 20 watt lamps
The (SP-30-40) for use with either 30 or 40 watt lamps
The (SP-100) for use with 100 watt lamps

Ask for descriptive literature

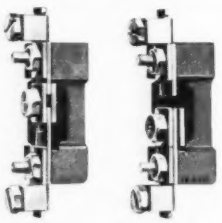
INDUSTRIAL ELECTRONICS CORP.

MAIN PLANT Newark 2, N. J.

Patented **SLIDE-A-LINK TEST BLOCKS** give twice the capacity at the bolted contact. Made in every size and style for any need. Removable solderless lugs or meter loops on all terminals.



#250-H is only one of over 40 styles and sizes.



Section View Showing Link in Closed Position.

Section View Showing Link in Open Position.

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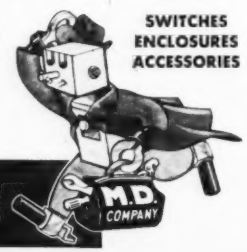


SWITCHES ENCLOSURES ACCESSORIES

METER DEVICES
COMPANY • CANTON, OHIO

PRODUCT NEWS

Conduit Spacer (500)

The Line Material Clevelon underground conduit spacer permits any combination of spacing from one basic 2-way design. Clevelon is a specially developed material consisting basically of asphalt and asbestos fibers, molded at exceedingly high temperatures and pressures; is said to be of long life and to be highly resistant to alkalies and acids. Though light weight, the spacer is claimed to withstand a vertical flat crushing test in excess of 1,200 lb. As listed by Underwriters' Clevelon is shown to be a high fire-resistant composition material. In tests there was no apparent softening when subjected to 160°F.

By means of a locking device cast into the spacer, it is possible to make all combinations in either even or odd multiples. Spacers are notched for convenience in sawing 2-way into 1-way spacers. The spacer may be cut down to size to fit each specific requirement.

Hoist Hooks (501)

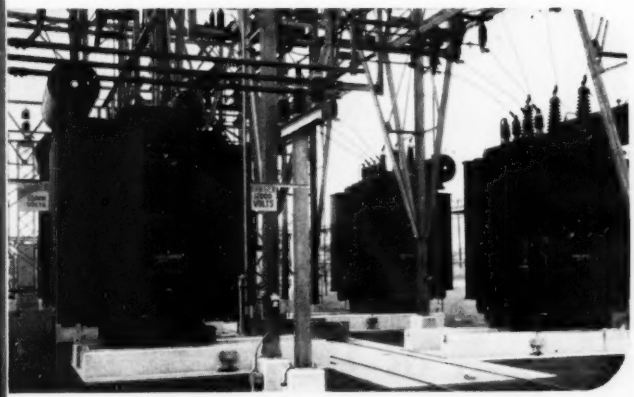
Brewer-Titchener has added drop forged safety hoist hooks to its line. Automatic mousing action with a safety-tie lip lock holds the point of the hook and prevents the sling from slipping off; also adds to the strength of the hook. The safety tie mousing automatically engages as the load is applied and disengages when the load is released. Two sizes of safety hooks, 5- and 10-ton, replace eight sizes of standard open hooks, according to the manufacturer. Both sizes will be available in two styles—with eye or shank bridge.

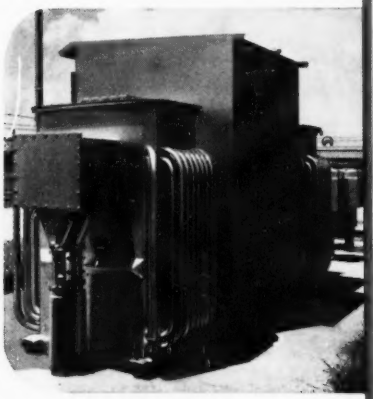
Rotating Gin (502)

A rotating gin for hoisting transformers and other heavy objects to the pole top is offered by A. B. Chance. A folding, 15-in. steel arm and rotating action of the laminated maple mast pole is said to assure easy clearance of crossarms and conductors. Two chain tighteners permit the gin to be fastened securely to poles from 6 to 11 in. in diameter, Chance says. Four gigs (two on each chain tightener) bite into the pole to prevent the gin from turning around the pole under load.

power
FOR PRODUCTION

This bank of Wagner Power Transformers is part of the main substation at the Houston, Texas Refinery of Shell Oil Company, Inc.





A Wagner Unit Substation, one of several small substations serving in the same plant.

In addition to power transformers, Wagner manufactures Rural Line, Distribution and Substation Transformers. Whatever your transformer requirements may be Wagner can furnish the exact type of transformer to fit your need.

Wagner
TRANSFORMERS
can solve your power planning problems

These power transformer installations, part of the recent catalytic cracking and lubricating oil plant extension at the Houston, Texas Refinery of the Shell Oil Company, are typical of Wagner Transformer installations for industrial power systems.

Wagner Power Transformers have established enviable records for continuous service in thousands of industrial plants and on transmission lines from coast to coast. Carefully controlled production methods, highest quality materials, rigid inspection and tests, and more than fifty-five years of transformer engineering experience mean that you can count on Wagner Transformers for dependable performance, plus added safety . . . added economy . . . and added service.

Users of power transformers will find it to their advantage to consult Wagner engineers on all of their transformer requirements. Wagner transformer users also profit by speedy, nationwide service facilities. Twenty-nine branch offices, manned by trained field engineers, are ready to serve you. Write for Bulletins TU-180 and TU-181 for information on the complete line of Wagner Transformers.

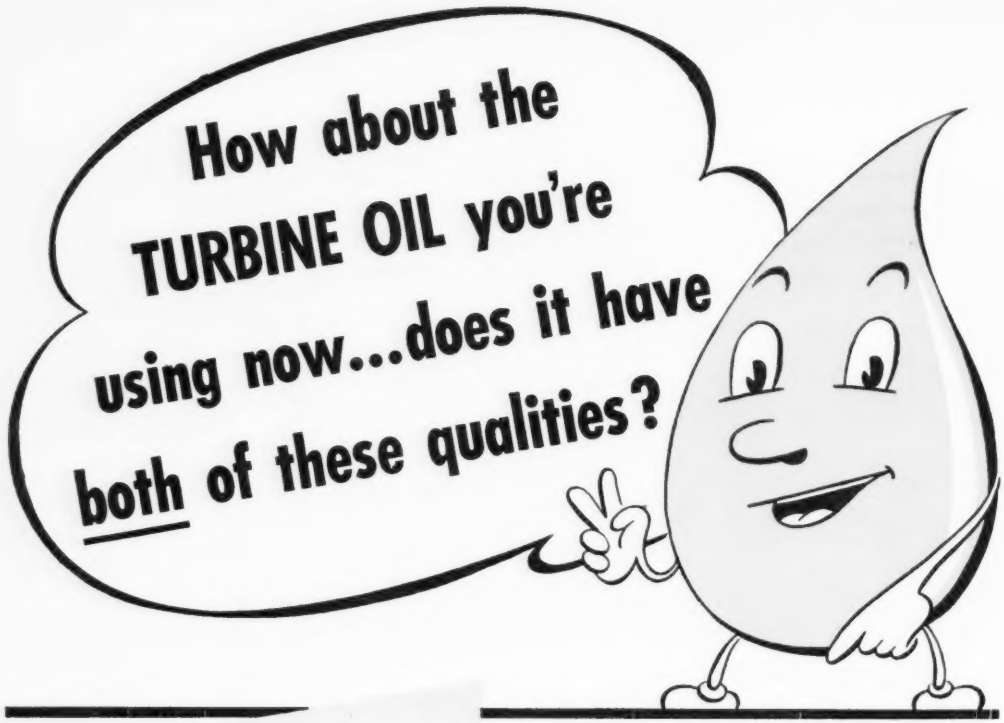
Wagner Electric Corporation
6381 PLYMOUTH AVENUE, ST. LOUIS 14, MO., U. S. A.

Consult Wagner Engineers on All Transformer Problems

BRIDGE BRAKES • POWER AND DISTRIBUTION TRANSFORMERS • MOTORS • UNIT SUBSTATIONS

ELECTRICAL EQUIPMENT AND AUTOMOTIVE BRAKE PRODUCTS

T49-2



SHELL TURBO OIL

SHELL

● Ordinary oils are no match for either of the two worst enemies of turbine lubrication — sludge and rust. The ability to withstand those enemies is present only in oils custom-made for turbine lubrication.

SLUDGE RESISTANCE IN SHELL TURBO OIL — to make turbine oil, Shell selects only crude stocks which are naturally high in sludge resistance (oxidation stability). Then after special refining, Shell Turbo Oil is fortified with Shell-developed additives... to build up even greater resistance.

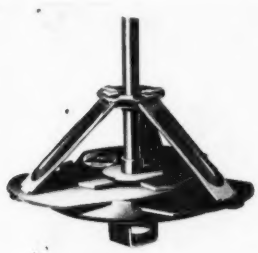
RUST RESISTANCE IN SHELL TURBO OIL — comes from another compound developed by Shell. It is this agent which gives Shell Turbo Oil its exceptional metal-wetting ability and its tough, airtight film.

The care in manufacturing Shell Turbo Oil pays off for users. Case histories prove that. After *years* of service, no deterioration of the oil, no sludge nor rust anywhere in the oil system — that's the kind of performance this outstanding oil has delivered in installations of all types. Isn't that the kind of performance you want?

Wire (503)

Turbotherm REL-16A insulated wire is primarily of hook-up and lead character, carries 105°C. rating, continuous operation for 300 and 600 volts. It is comprised of a vinyl dielectric with a closely braided lacquered glass jacket, claimed to provide a general-purpose wire, possessed of superior electrical thermal and physical characteristics. Its operating range of —10°C. to 105°C. permits the user to have one wire for all hook-up and lead applications. The high-heat-resistant thermoplastic wire is free stripping and is Underwriters' approved. Turbotherm is manufactured by William Brand & Co.

Expanding Anchor (504)



The new L-M expanding anchor has a sliding-plate design; its rigid cone-shaped base plate is made of high-strength structural steel. The blades are said to give maximum holding power and, once expanded, to hold in a positive position. Anchor will not come apart in shipment or open prematurely while being installed, the announcement states. Nut retainer permits reclaiming anchor rods where temporary installations are made. Available in 2-, 3- or 4-way designs; all anchors will accommodate ½-, ⅝- and ¾-in. diameter rods. REA approved.

Wireway Elbow (505)

Keystone has a new 90° elbow for wireways. According to the manufacturer, the large radius of the inner side of the elbow is to aid in pulling wires around corners. It comes in two standard sizes: 4x4 and 6x6 in., with hinged cover and knockouts; is of black enamel. For coast regions, it is plated for protection against climatic conditions, the manufacturer states.

Clamp (506)

An adjustable channel clamp for supporting runs of conduit from structural channel or angles, where drilling is forbidden or costly, has been announced by Kindorf Co. This clamp has a load rating of 500 lb., with a safety factor of five, it is stated.

Splice (507)

Fargo Mfg. Co. announces a new type JS series junior automatic splice. It is available in three sizes, including No. 6, 4 and 2 solid copper wire.

Connectors (508)

Cannon Electric has redesigned its vibrationproof series of AN-type connectors and has added new features, including radio-shielding, pressurizing, moistureproofing.

KLEINS

FOR MEN WHO WANT

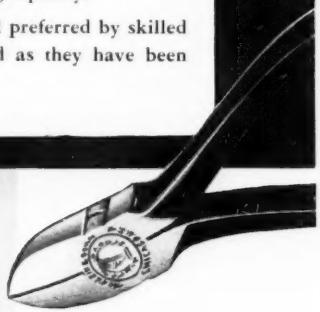
the Best

• Ever since the first communication and power lines were strung, Klein Pliers have been the favorite tools of electrical workers.

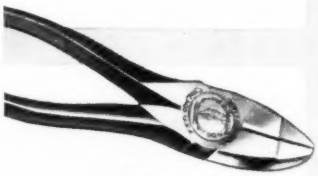
Today, Klein Pliers are made with the same exacting care that has won these tools their reputation for high quality.

Klein Pliers are still preferred by skilled workers in every field as they have been "since 1857."

No. 201. Original pattern husky Klein Side Cutting Plier. Square nose. Made in four sizes—6, 7, 8, and 9 inches.



No. 242. Klein Oblique Cutting Plier (heavy-duty pattern). A very useful tool that cuts close. Length, 6 inches.



No. 201 NE. The famous "streamlined" Klein Side Cutting Plier. Made in four sizes—6, 7, 8, and 9 inches.

No. 203. Klein Long Nose Plier. Long reach of jaws permits getting into difficult places. Made in 6 and 7-inch sizes.

The Klein Pocket Tool Guide, showing the Klein line and containing useful tool information, will be mailed on request.

Established 1857

Mathias Established 1857 KLEIN & Sons Chicago, Ill., U.S.A.

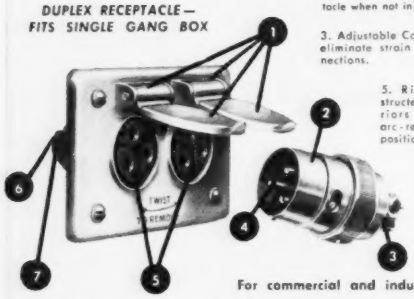
1200 BELMONT AVE. CHICAGO 18, ILL.

NEW! R&S AUTOMATIC LOCKING Midget EVER-LOK PLUGS, RECEPTACLES & CORD CONNECTORS

FOR SAFE, DEPENDABLE PERFORMANCE

DUPLEX RECEPTACLE— FITS SINGLE GANG BOX

1. Spring hinged, gasketed covers close receptacle when not in use.
2. Plated steel housings fully protect the contacts.
3. Adjustable Cord Grips eliminate strain on connections.
4. Contacts are precision-made, self-wiping, and self aligning.
5. Rigidly constructed, all interiors of molded arc-resisting composition.
6. Heat-treated beryllium copper contacts and terminals . . . an advanced EVER-LOK feature.
7. Compact design provides ample capacity, yet allows for easy wiring.



For commercial and industrial applications.

10 ampere 125 or 250 V. A.C. or D.C.

All units are steel clad, fully grounded and are complete with the R&S Ever-Lok automatic feature that positively eliminates strain on contacts or connections.

Full details in catalog EL49- 10

83

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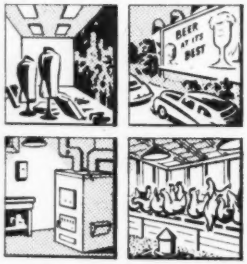
RUSSELL & STOLL COMPANY, INC.
Precision-Built Electrical Equipment
125 BARCLAY STREET, NEW YORK 7, N. Y.

SINCE 1902

SWITCH "ON" • REGULARLY
SWITCH "OFF" • AUTOMATICALLY
• ELECTRICALLY

WITH A FAMOUS TORK TIME SWITCH
PLAIN OR ASTRONOMICAL

Tork Clock Time Switches are world renowned for their dependability and accuracy. They require no regular attention, and are available in many electrical capacities for both indoor and outdoor use.



There's a TORK CLOCK for every need. Economically priced from $9.50

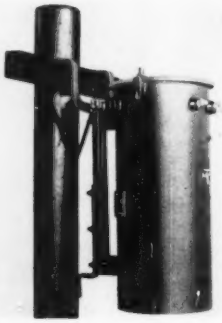
Send for free literature.

NEW! SPECIAL FEATURES
TORK
ASTRONOMIC "FOLLOW the SUN"
30 HOUR SPRING RESERVE.
CLOCK CO., Inc.
1 GROVE ST., MOUNT VERNON, N. Y.

Circuit Breakers (509)

A line of type DB 600-volt d-c or 250-volt a-c circuit breakers offered by Westinghouse is claimed to have extremely accurate tripping characteristics for low-voltage power distribution in industrial plants. Accurate control for long time delay with protection from tampering is provided by a new time-delay element assembly in an hermetically sealed tube. Breakers are available for overcurrent protection with delayed and instantaneous tripping for use on motors and for general purposes or for overcurrent protection with both long and short delay for proper coordination in selective protection or fault current. Two frame sizes are available. The DB-15 has an interrupting rating of 15,000 amp. with load current ratings up to 225 amp. at 600 volts a-c or 250 volts d-c. The DB-25 is rated for load currents up to 600 amp. with an interrupting capacity of 25,000 amp.

Transformer (510)



A dry-type distribution transformer, with air cooling, has been announced by Marcus as type ACO and is available to 100 kva. and 5,000 volts. Fiberglas, mica, porcelain and Quinterra and similar inorganic materials are used, according to the announcement. The transformer element is seal protected against oil, acids, moisture, etc. and is housed in a ventilated, weatherproof case said to conform with all applicable EEI-NEMA construction standards. It may be used outdoors, pole or platform mounted, or indoors at the load center, mounted wherever convenient.

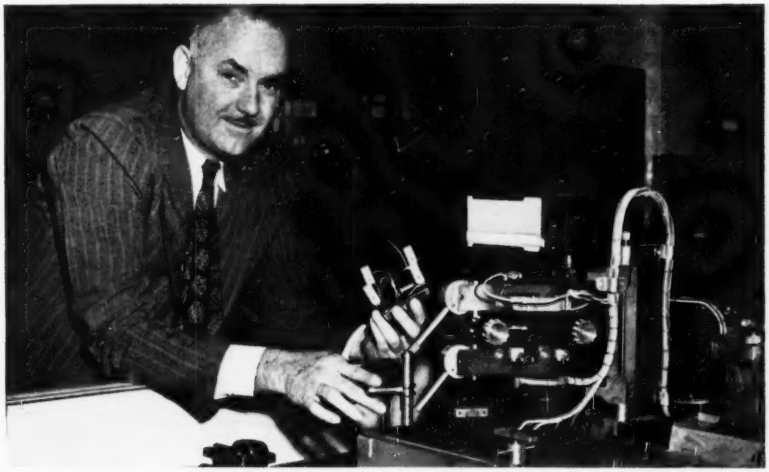
Cutout (511)

General Electric has a heavy-duty indicating cutout for fusing sizable transformer banks or sectionalizing heavy feeders. Rated at 200 amp., the new unit has been designed to give an 8,000-amp. full-range interrupting rating at 2.5 kv. (or line-to-neutral on 4,160 or 4,330-volt grd. Y, 4-wire system) complementary to the original interrupting rating 5,000 amp. at 5 kv. (or line-to-neutral on 8,330-volt grd. Y, 4-wire system) Has improved bracket to permit swivel mounting, may be converted to a 400-amp. disconnect cutout by changing the door.

Switches (512)

Arrow-Hart & Hegeman Electric Co. is offering new flush-tumbler switches in 10- and 20-amp. ratings for all standard connections, in single- and double-pole and 3-way, 4-way and single-pole, quadruple-break models. They are designed for back or top wiring.

— new facilities assure — accuracy and uniformity in — new I-50 watthour meter! —



This electronically controlled power-factor adjusting device is one of the many pieces of new equipment designed especially for I-50 production. It permits the electromagnet to be accurately lagged before installation in the meter—another assurance of accuracy and uniformity in the I-50.

The I-50 watthour meter is completely new from terminals to cover—and so are the facilities we're using to produce it. We've equipped an entire new plant—from screw drivers to assembly lines—with the most modern equipment for I-50 production.

And what are your benefits? With every I-50 order you place, you get a meter with greater sustained accuracy, longer life, and lower maintenance costs than ever before possible. These benefits result from our modern facilities, plus specially trained personnel, rigid quality control, and precision manufacturing techniques.

H. H. Campbell

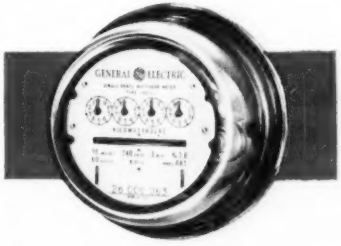
Superintendent of Meter Manufacturing
Meter and Instrument Divisions
West Lynn, Massachusetts

Type I-50, the first completely new watthour meter in 50 years

Place your order for socket- or bottom-connected types with your nearest General Electric representative. Apparatus Department, General Electric Company, Schenectady 5, N. Y.

NEW FEATURES FOR LOWER MAINTENANCE

1. Co-ordinated insulation—for better performance under adverse operating conditions.
2. Magnetically suspended rotating element—to do away with bearing maintenance.
3. Braking magnets die-cast in frame—to assure calibration stability.
4. Current coil molded in butyl and potential coil in polyethylene—for greater insulation and stability.
5. One-piece molded "S" base—to minimize corrosion.



GENERAL ELECTRIC

GEL-81

With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

GET THE EXACT BRUSH SIZE & BEVEL

FOR YOUR MACHINES

HELWIG CUSTOM-MADE BRUSHES are designed to fit your machines at no extra cost.

HELWIG CUSTOM-MADE BRUSHES have no "field variation" — they're shaped precisely at the factory.

HELWIG CUSTOM-MADE BRUSHES end shutdowns while so-called "standard" brushes are cut down.

To find out how you can save money and man-hours in your shop, call the Helwig office near you . . . today.

TRANSERT BRUSHES

Reduce Ring Wear

Longer life for your rotating machines! The transverse graphite insert gives uniform friction characteristics even with low humidity. And you also get even current distribution, better ring lubrication.

U. S. Pat. 2,105,038

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HELWIG SPEER

HELWIG CO., Carbon Products

Makers of Multiflex and Transert Brushes

JEFFRIES

TRANSFORMERS

BUILT TO ORDER IN A HURRY!!

When you are installing or re-arranging—and need a special transformer to exactly match your requirements call on us. We can deliver in a week to 10 days.

Specify scattered transformers to eliminate duplicate conduit runs and save on power costs.

JEFFRIES TRANSFORMER COMPANY

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Lead—Braid Covered Cables and Wires—Tinsel and Copper Cordage—Special Cables.

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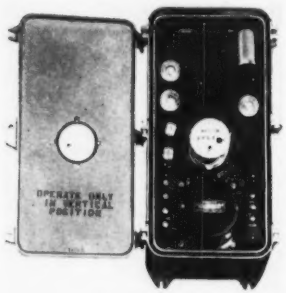
TRICO FUSE MFG. CO.
Fuses, Oilers, Clip Locks and Fuse Pullers

BURKE ELECTRIC COMPANY
Bakelite Controlead Terminal Blocks

Integrator (513)



An industrial integrator, model 808, has been announced by Weston for continuous sensitive integration of electrical quantities. Designed for use in general industrial and research applications, this device is said to provide means for simple integration of d-c potentials or currents with respect to time. Fundamental elements are a model 806 integrating relay, electronic relay circuit with associated sealed-reed-type relays and a counting mechanism. The model 806 is the primary element, operating the relay circuit to initiate an oscillatory action, the frequency of which is proportional to the input. The counter totalizes the number of cycles to provide a running time-integral of the input. The unit chassis is mounted and enclosed in a cast-aluminum weatherproof case.

Motor Kits (514)

G-E is offering a new line of fractional horsepower motor construction kits for teaching aids in school shops and laboratories. Each kit contains the necessary components, completely machined for assembling a full-size, regulation motor. Wire and varnish are not included. These kits are available in four sizes: ¼ and ½ hp. single phase capacitor-start type, ½ hp. three phase and a d-c unit suitable for use as a 300-watt generator or ½-hp. motor.

Bender (515)

Tal Bender has introduced a new thin-wall tubing bender designed primarily for EMT tubing but said to be practical for hard copper tubing, stainless steel tubing and thin-wall tubing of other commercial metals. This bender has two parts that fasten together with a U key. It will handle all standard sizes of tubing from 1- to 2-in. diameters and a special 2-in. former is available for making parallel bends, the manufacturer states.

At last

BUILDING WIRE THAT LASTS LONGER, PULLS EASIER, SAVES MONEY

...Thanks to

TRIANGLE'S

new braid of

GLAZON

TRADE MARK

For EXTRA value—at NO extra cost—Insist on "GLAZON"

What "GLAZON" is:

"Glazon" is a tougher, more flexible, longer-lasting braid that combines the desirable properties of an inorganic substance derived from glass with those of special saturants to achieve a new high in safety and durability under the most adverse conditions. This new protective covering gives:

LONGER LIFE. Conductors and insulation are doubly protected by a stronger, tougher, more impervious and more durable covering than heretofore possible.

SMALLER DIAMETER. Braid, although stronger, is considerably thinner. Strands lie flatter, clasp insulation tighter, absorb less saturant—reducing diameter.

GREATER FLEXIBILITY. Less bulk and greater elasticity of the braid increase flexibility.

SMOOTHER SURFACE. Uniformity of fiber and tighter lays eliminate the uneven surface common to many braided coverings.

GREATER RESISTANCE to the destructive elements of man and nature: water, heat, oil, acid, corrosive fumes, fungus, rodents, sunlight, freezing, rotting.

IMPROVED FISHABILITY. "Glazon" covered wire can be snaked through longer conduits, around sharper bends, easier, quicker, than any other type.

EVEN SURFACE, free from bumps and ridges, slides easier.

SMALLER DIAMETER saves space, makes it twice as easy to snake in "that last one."

SMOOTH FINISH prevents sticking, reduces friction on long runs and around sharp bends.

TOUGH COVERING resists impact and abrasion.

GREATER FLEXIBILITY saves time in wiring every junction box, switch box, outlet box.

Costs No More—Yet Saves At Every Step of the Wiring Job

Available in sizes from No. 14 through No. 6 AWG with solid or stranded conductor. Types R, RH, RW.

If It's "GLAZON" It's Made by TRIANGLE . . .
If It's Made by TRIANGLE It MUST Be Right!

For full details, contact your nearest Triangle jobber, or write

ARTERIES FOR ELECTRICAL SYSTEMS — INCORPORATED

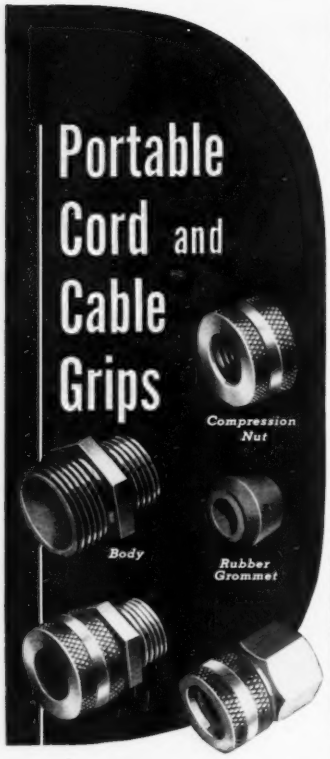
IT MUST BE RIGHT!

TRIANGLE CONDUIT & CABLE CO., INC.

1904 JERSEY AVENUE, NEW BRUNSWICK, N. J.

PLANTS: NEW BRUNSWICK, N. J. • MOUNDSVILLE, WEST VA.

BUILDING WIRE • BARE WIRE • ARMORED CABLE • "GLAZON" TRIEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE, SERVICE DROP, VARNISHED CAMBRIC BRAIDED OR LEADED, TRIOPRENE TRENCH, POWER AND PARKWAY CABLES RIGID CONDUIT • ELECTRIC METALLIC THIN WALL CONDUIT • FLEXIBLE STEEL CONDUIT



Cord and cable grips for portable wiring offer a complete line of substantially built fittings for heavy duty service. The standard types shown have aluminum body, aluminum compression nut, and single hole rubber grommet. Two and three hole grommets can also be furnished.

Angle types are available; also female bodies with or without chase nipples; also with serrated body for mounting in sheet metal panels or cabinets.

Compression nuts with split clamp, with hose attachment, with extended handle, or with cord protecting spring are available. Couplings for flexible conduit can be supplied.

Consult your Pylet Catalog 1100 for complete listings.

SINCE 1897

THE PYLE-NATIONAL COMPANY

1364 N. Kostner Ave., Chicago 51, Ill.

Pacific Coast Sales Office
25 Beale Street, San Francisco 6, Calif.

Panelboard (516)

Trumbull has added a panelboard for group and branch circuit control of lighting distribution for stores, garages and residences. According to the announcement, the panelboard is low in cost, has a hot-molded phenolic section containing six complete circuits. It was designed to fit standard stud walls without projections. NTPS panelboards are made with 6 and 12 circuits and have solderless lugs in mains. Underwriters' approved.

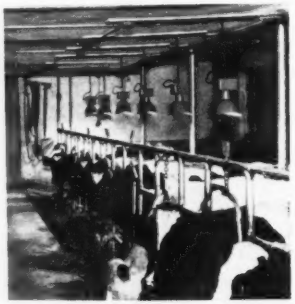
Tape (517)

A Coil-Flex fish tape has been introduced by Ideal Industries for use in all types of conduit, including aluminum. It is said to be very flexible; has a round surface and ends are smooth and round. The Coil-Flex consists of a 25-ft. length of steel spring 11/32 in. in diameter with a rustproof inner steel cable. Threaded fittings on the ends aids in joining lengths. This tape can be rolled into a 10-in. diameter circle. Factory inspected and tested at 400 lb. pull.

Connectors (518)

G-E has a new line of solderless connectors featuring serrated, silver contact surfaces, interlocking sides and which are said to accommodate a wide range of conductor sizes. Types are straight, tee, block, terminal, angle, parallel, ground, in both class a-1 and a-2; also available are expansion bends, busbar clamps and live-line disconnecting clamps.

Cable (519)

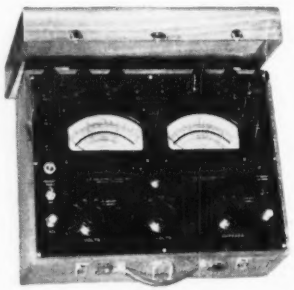


A non-metallic sheathed cable for barn, stable and milkhouse and other farm building wiring is being manufactured by National Electric Products Corp. It bears the label, NE-o-Prene loomwire. Underwriters' seal of approval for use up to 600 volts; is available in No. 14 and 12 wire sizes, in 2-conductor type and in standard coil lengths. The manufacturer claims an improved resistance to moisture, fire and rot; increased mechanical strength, smaller diameter, simplified installation and smooth protective sheath of Neoprene. The two insulated conductors are spaced by a rubber separator which has incorporated within it twisted Fiberglas cords for added tensile strength. Over conductors and spacer is a containing Fiberglas braid. The outer sheath of Neoprene is said to form a jacket that seals out flame, fumes, oil and grease, and resists rot, acid and mold.

Gage (520)

A magnetic strain gage, providing a simple method of directly measuring small distortions in a static member resulting from a tensive or compressive load, has been announced by Westinghouse. It consists of a strain gage enclosed in a watertight case and pilot bar sensitive to a force as small as 20 lb., mounted on the supporting member, and a controller with indicating dial located wherever desired near the operator. Operation is from a single-phase, 110-volt, 60-cycle supply. Voltage and frequency variations should not exceed plus or minus 3%. Power required is 35 va.

Analyzer (521)



Cole's model 3700 a-c industrial analyzer is available in the following ranges: 0-150, 0-300, 0-600 volts; 0-5, 0-25, 0-125 amp.; 0-250, 0-50,000 ohms-Z; .05-10, 10-5,000 microfarads. All ranges are direct reading on extra long 5.25-in. mirror scales provided with knife-edged pointers for high accuracy in reading and to eliminate parallax errors. Accuracy—volt and ampere ranges, 1% of full-scale value; ohms-Z and capacity average, 3% of indicated value. Weight, 27.4 lb. This unit was designed especially for electrical maintenance engineers, maintenance and service men; uses include analyzing industrial loads, checking load balances, installation and testing of single and polyphase motors up to 25 hp. at 115 volts, 50 hp. at 230 volts and 100 hp. at 600 volts.

Molding Powders (522)

A new line of fast-curing phenolic molding powders developed by General Electric is claimed to permit plastics manufacturers to speed production and reduce material costs. These general-purpose powders are available in special granulations for high-speed automatic molding and in stock grades for conventional operations.

COMING THROUGH!

Simplex Paper-Insulated Cables ARE "DELIVERING THE GOODS" WHERE LARGE AMOUNTS OF POWER MUST BE TRANSMITTED AT HIGH VOLTAGES

And little wonder. For only the finest in design, materials, and workmanship goes into the manufacture of Simplex Paper Cables . . .

. . . Paper insulation that features high dielectric strength, low dielectric losses and low power factor, and which can be used at copper temperatures up to 85°C., depending on the operating voltage.

. . . Impregnating oil that is free of gas, moisture, and impurities.

. . . Metallic shielding or belting to best meet the conditions under which the cables must operate.

. . . Lead sheaths which, through sound foundry practice and careful extrusion, are unimpaired by oxides, poor welds and eccentricity.

All add up to performance that's trouble free; performance you can depend on.

Simplex Paper Cables are made in single or multi-conductor types, protected by a lead sheath alone, or by a lead sheath with wire armor or a reinforced rubber jacket. They are suited for use in underground, aerial, and submarine installations. Write us at the below address for full details.

SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

Feature Devices from the KULKA Line

The KULKA SWIVEL-SOCKET *Spot-liter*

No. 168
With 6 ft. cord
Fully wired
Ready to plug-in
660 W-250 V

Used with Spotlight or Floodlight Bulbs up to 300 Watts

DIE CAST BASE WITH ATTRACTIVE STATUARY BRONZE FINISH

—Has Convenience Outlet

A thoroughly engineered, yet handsome appliance. Adjustable to full 90° in ONE OPERATION. The unit is lightweight, yet sturdy—and so steady it won't tip over. Has convenience outlet in base to permit banking without junction blocks and cords. Also has bayonet lock in base to allow use as a pin-up lamp. Ideal lamp for show windows, etc., but also makes fine "sun lamp" or "infra red" lamp for home use.

Write for Circular, or Catalogue of Complete Line

KULKA ELECTRIC MFG. CO.
30 SOUTH ST., MT. VERNON, N. Y.

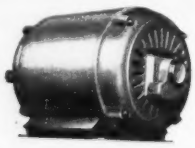
ALL the strength and durability inherent in steel are combined—with definite economies—in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

Headquarters

MAGNET WIRE



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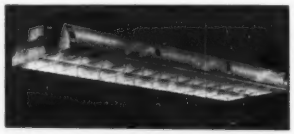
SEATTLE, 2406 First Ave. — PORTLAND, 325 N.W. 6th Ave.
DENVER, 1015 Twenty-first St.

F Fixture (523)

Pittsburgh Reflector Co. has introduced the Monroe A-5000 series fluorescent units designed for schools and offices. These luminaires use two 40-watt T-12 lamps, are 48 in. long, 12½ in. wide and 5 in. deep; are for ceiling or pendant mounting individually or in continuous rows. The A-5240 PL has translucent plastic side panels, the A-5240 AL has aluminum side panels and A-5240 ST is all steel. All three have one-piece, removable louver assemblies. They give downward and upward light distribution and have 35° crosswise and 25° lengthwise shielding.



Infrared Unit (524)

A 6-light infrared portable heating and drying unit for the electrical, automotive and manufacturing fields has been introduced by North American Electric Lamp Co. It includes Nalco inside-aluminumed, self-reflecting lamps; is adjustable from 18-in. to 6-ft. high; is mounted on four casters. Assemblies may be tilted to any angle or swung in a vertical or horizontal position. Two or more units may be combined for large-area drying. Comes with six R-40 lamps and 20 ft. of approved cord and plug.

Plastic Covering (525)

Keystone Electric Mfg. Co.'s new line of plastic-covered fluorescent units, the Plasti-Lite series, is for two, three and four 20-watt lamps and for two 40-watt lamps. They are shielded; are available for commercial and residential use. Opal fluted plastic is said to give a soft glareless diffused light. Shielded enclosure is removed for servicing.

Slimline Unit (526)

Bright Light Reflector Co. is offering a 2-lamp industrial unit for 75-watt, 96-in. T-12 slimline lamps. It is furnished either with porcelain enamel or baked enamel reflectors, white inside, grey outside. The top channel is one-piece, heavy-gage steel, finished in grey baked enamel. It has the E-Z Lok attachment for assembly or disassembly of reflector from hood without disturbing wiring and auxiliaries.

Industrial Fixture (527)

A new low-priced, 2-lamp industrial type fluorescent lighting fixture has been announced by Sylvania. Known as the Economy Model EF-240, the fixture is packed two per package. Each unit includes two 40-watt lamps plus starters and is shipped completely wired. The one-piece chassis is of 20-gage steel.

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

Here's Better Protection for Low-Voltage Circuits

The NEW "DB"

It's a completely new breaker, designed for severe, continuous duty as the protective link between the power source and your productive equipment. Its many features are all planned to provide minimum maintenance throughout a long operating life:

New Overcurrent Tripping Device—Hermetically-sealed overcurrent trip provides time-delay on overloads, plus instantaneous tripping on fault currents. Short time-delay characteristics on fault currents for selective tripping when specified.

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Here's COMPLETE Information

Get answers to your questions, plus complete, detailed information from the new DB Breaker Book. Ask your Westinghouse representative or distributor for your copy of B-4067, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

Westinghouse

"DE-ION" CIRCUIT BREAKERS

New Type DB

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That's the big test of any Fitting, isn't it? A smooth, easy installation! And, to be sure of Fittings that do fit smoothly you must have a uniformity and exactness of product that can be depended upon *ALWAYS*. You're sure of this kind of Fitting when you specify Wagner Malleable.

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New illustrated Catalog 483 is yours on request. Write today for your file copy.

WAGNER

Malleable Fittings

Western Representatives: Murchy-Main Company, 750 E. Second St., Los Angeles 32, Calif. Fred E. Stabile & Sons, 2040 Arapahoe St., Denver 2, Colo. Hodges & Glomb, 1264 Folsom St., San Francisco 3, Calif. Northwestern Agencies, 1150 First Ave. S., Seattle 4, Wash.

BULLETINS ETC.

Load Center (528)

Information about the Westinghouse Quicklag Loadcenter is given in a new 12-page booklet, designed to describe this type of breaker to architects, contractors and others.

Switches (529)

Types PSW and PSWA outdoor group-operated air switches for pole-top use on rural and distribution lines are described in a release from Pacific Electric Mfg. Corp. These tilting-insulator vertical-break switches are 7.5, 15, 23 and 34.5 kv., 200 amp.

Switchboards (530)

Square D standardized switchboards are described in a recent release from that company.

Farm Welding (531)

G-E has published a 24-page booklet, "87 Welding Ideas for the Modern Farmer." It features case histories of welder use to repair, remodel and fabricate farm equipment. It is listed as publication GEA-5053.

Wiring Devices (532)

Pass & Seymour has issued catalog No. 49 of its wiring devices.

Rectifier (533)

Vickers has published its selenium rectifier catalog VC-3000.

Instruments (534)

Leeds & Northrup has a 34-page catalog of its instruments for measuring temperature of generators, motors, condensers, etc.

Thermocouple (535)

Wheelco Instruments Co. has released a thermocouple manual on selection, methods of checking, installation data. Price list included.

Machine Lighting (536)

Adjustable Fixture Co. is offering a catalog of its lighting equipment for machine and bench tools.

F Ballasts (537)

A 20-page bulletin from G-E gives data on installation, operation and testing of ballasts for fluorescent lamps. Contains tables of ratings and test data on G-E lines, as well as wiring diagrams.

Voltage Regulator (538)

Burlington Instrument Co. has a new release on its type WA rheostat voltage regulator.

Transformer (539)

Pennsylvania Transformer Co.'s Pole Star catalog No. 349 describes a new transformer featuring a core wound of cold-rolled steel, with an inherent, low exciting current.

Industrial Turbines (540)

A 20-page booklet B-3896 gives information on the Westinghouse type E industrial turbines.

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Please send me information about following CIRCLED items:

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* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

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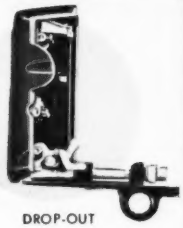
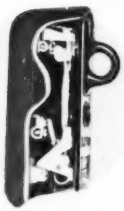
Four Cutouts in one!



DROP-OUT

RECLOSING



DISCONNECT

These General Electric enclosed fuse cutouts simplify your stocks. With ***three interchangeable doors***, which fit both 5-kv and 7.5-kv housings, you get four operating functions—indicating, drop-out, two-element reclosing, and disconnect.

This is flexibility that spells real economy. By stocking only two housings and three doors, you can fill ***all*** your 50-ampere primary fuse-cutout requirements for circuits up to 12.5 kv Gr-Y—including a disconnect good for 100 amperes. The same flexibility is also available in 100-ampere cutouts, providing a 200-ampere disconnect.

When you need visual indication of a blown fuse, these are the cutouts to use. They are liberally designed—have permanently high dielectric strength, provide full-range interruption of fault currents and are conservatively rated as to interrupting capacity. All live parts are completely enclosed for maximum safety. For complete information, see your nearest G-E Representative, or write for Bulletin GEA-3448. ***Apparatus Department, General Electric Company, Schenectady 5, N. Y.***

GENERAL ELECTRIC

498-30

Primary Fuse Cutouts for all Service Requirements

Non-indicating enclosed fuse cutout

Open-type cutout with drop-out fuse holder

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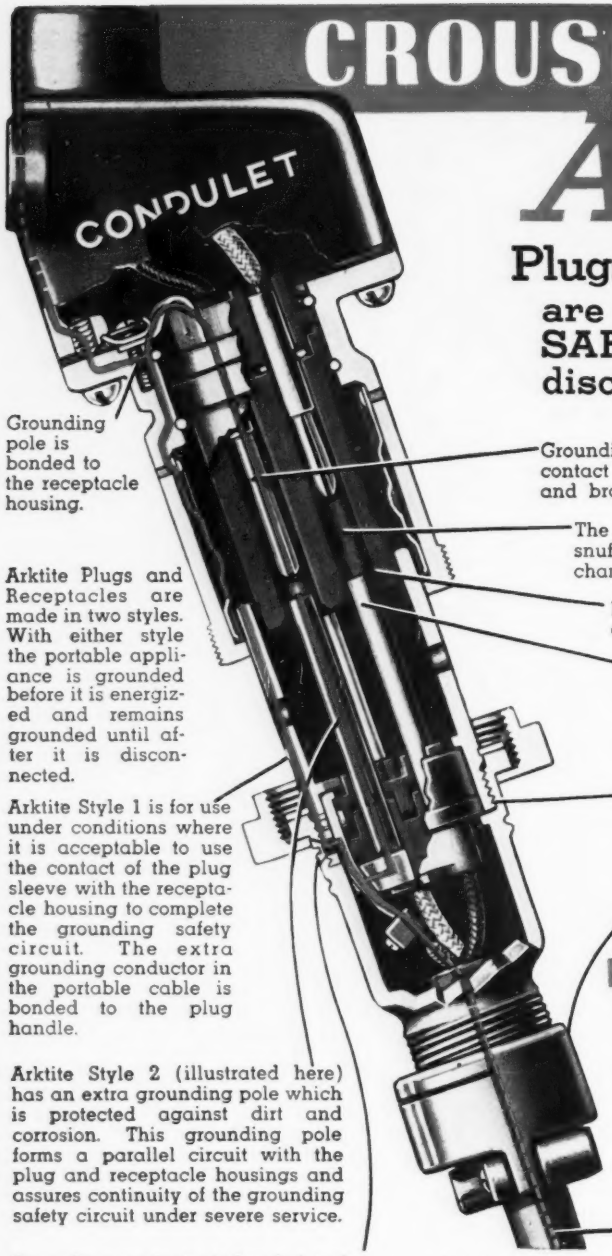
With factories in Anaheim, Los Angeles, Oakland, Ontario, San Francisco, San Jose, Seattle, and Richland, and Sales Offices in twenty Western cities.

CROUSE-HINDS

Arktite

Plugs and Receptacles are circuit breaking and SAFE without additional disconnect equipment.



Grounding pole is bonded to the receptacle housing.

Arktite Plugs and Receptacles are made in two styles. With either style the portable appliance is grounded before it is energized and remains grounded until after it is disconnected.

Arktite Style 1 is for use under conditions where it is acceptable to use the contact of the plug sleeve with the receptacle housing to complete the grounding safety circuit. The extra grounding conductor in the portable cable is bonded to the plug handle.

Arktite Style 2 (illustrated here) has an extra grounding pole which is protected against dirt and corrosion. This grounding pole forms a parallel circuit with the plug and receptacle housings and assures continuity of the grounding safety circuit under severe service.

Grounding conductor is bonded to the plug handle.

Grounding pole is longer than the others so contact in the grounding circuit is made first and broken last.

The arc formed by pulling the plug is instantly snuffed in the confined insulated arcing chamber.

Each plug contact fits closely the opening of its individual arcing chamber.

The arc is broken while the plug contact is still a considerable distance inside of the arcing chamber. There is no danger of the arc traveling over to the other side of the circuit or to the housing.

Two-piece plug is easy to take apart and reassemble.

Direct-pressure clamp insures postive grip on the conductor cable.

CROUSE-HINDS offers the only complete line of circuit breaking plugs and receptacles—20 Amp. to 400 Amp., 250 volt D.C., 600 volt A.C.

Complete listings are in the Condulet Catalog.

The green line indicates the grounding safety circuit.

Arktite Style 2. Sectional View

A Nationwide Distribution Through Electrical Wholesalers

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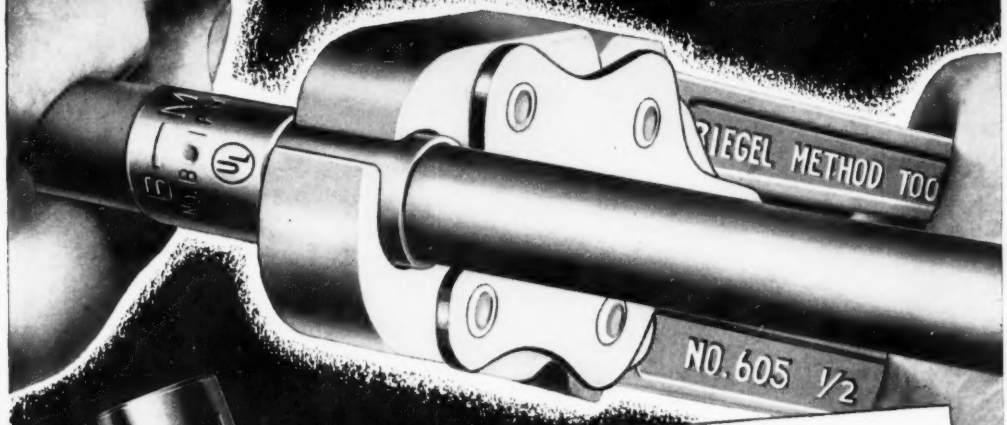

Cross Section Showing Indentations

• NEATER • STRONGER • FASTER • APPROVED

All B-B Fittings Carry the Underwriter's Seal of Approval and Canadian Standards Ass'n Approval No. 9296

Select the best, insist on Briegel All Steel Fittings, the original approved Indenter type connectors and couplings for thin wall conduit tubing. You will not only find that Briegel Indenter Fittings are easier and faster to use, but also make neater, stronger connections, the correct connections. Two Easy Squeezes and they're set. Start using Briegel Fittings today. Have more satisfied customers—more profits from each job.

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BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

ELECTRA'S HUSBAND

PRE-TV FIGHTS

"WHEN are you going to let me bring home a television set?" I asked Electra one evening recently when I was helping with the dinner dishes.

"What do you mean, let you?" she countered. "Since when have you had to ask me what you could do? You do what you want anyway. But let me tell you something in this instance. The day you bring a television set through that front door, I walk out."

"Oh, you're prejudiced." I said. "If we had a set in the house for just two nights, you wouldn't let me take it away. Apparently you don't know that television is going to revolutionize entertainment in this country."

"It will revolutionize living in this house, because you will be here all alone," she interrupted. "I'm a radio widow now. If we had a television set, you never would talk to me."

"Now you know that you like some of the radio progams," I argued. "You listen avidly to 'People are Funny' and 'Truth or Consequences' and Groucho Marx."

"Yes, but I hate baseball broadcasts and fights and hockey games such as you tune to most of the time," she said. "And from all I can learn from my friends, that is the kind of stuff you husbands insist on looking at with television. It's no wonder that most of the women I know are anti-television."

"Oh, come now. There are plenty of other programs being televised," I said. "And furthermore, I think that these women you speak of have seen television only at a dealer's store. The reports I get from people who have had television in their homes are a different story. There's a lot of proof that women who didn't like boxing or wrestling or hockey or baseball because of the rugged atmosphere where they took place have become rabid fans now that they can see all the gory details in the comfort of their living rooms. You know the Nash family. Well, John tells me that his wife, who never saw a live hockey game in her life, became such a fan this winter that she had the local PTA meetings changed from Wednesday night to Thursday night so she wouldn't miss one of the games. His mother-in-law has become such a baseball fan this spring that she won't clear the table or wash the dishes until 11 o'clock or later on the night that the Seals play. In fact, the sports over television have become so much of a woman's pastime around the house—they are now inviting their girl friends—that John goes into his den or greenhouse where he can listen to the radio version without female company. So you'd better have some better reasons."

"Well, I'll recite some of them then," she said. "In the first place I don't want my living room looking like a theater every morning when I come in to dust it. And that's just what it will be with the furniture all turned toward a television set. And I don't relish the wear and tear on the furniture from having a houseful of your pals in every evening. Besides, if we had a set, our whole living room would have to be rearranged.

"But if you really want to know why I don't like the idea, let me give you the reactions of some of our friends. Howard Mathews in New York thought he could fool his wife by purchasing a set for his daughter. She can keep the set turned on only until nine o'clock on school nights. So, do you know what he does? He lugs the set downstairs into the living room where he has an extra television antenna installed. Then he sits there until 12:30 every blessed night like a zaney taking in everything on the air. He never saw a real prizefight in his life. Now he's a rabid fan. Wilma Mathews says she has to beat him with a club to get him to bed. He stays up as long as anything is being telecast."

"I wonder what Wilma Mathews would say if she knew he was thinking of buying one of those new 16-in. screen sets," I mused. "But, you haven't talked to the Emerys. Their experience is totally different. For the first time since they started raising a family, they have a little quiet time at the end of dinner for personal conversation. Since they got a television set, the kids are punctual in sitting down to dinner. At seven o'clock, the three children get up from the table and head for the television set to hear and see the nightly children's program. For the next half hour, Harold and Harriet sit peacefully enjoying their after-dinner coffee and talking about the things that a couple with three growing kids discuss. Harold says 'Peace—it's wonderful!'"

"On the other hand, Muriel Rodgers says that watching television has a definitely bad effect on kids," Electra said. "She thinks it is something for a psychiatrist to investigate. One of her friends has a year-and-a-half-old youngster that sits entranced in front of the television set sucking its thumb and playing with its navel. It sort of hypnotizes him."

"There are plenty of our friend's children who need psychiatrists, and it doesn't take television to bring it out. Anyway, we haven't any youngsters, so it doesn't apply."

"Yes, but some of our nephews and nieces visit us occasionally, and you wouldn't want them afflicted like that," she commented.

"Well, they might be afflicted with just a short exposure to television—just as if we parked them at the movies for 48 hours. But in the long run, children seem to learn how to take television or leave it alone. The Emerys tell me that their children, after four months of television, have become very critical of the programs. If it doesn't interest them they go ahead with their regular play. And the surprising thing, they say, is the children's interest in the educational programs."

"Yes, I've heard that the children get very interested," said Electra. "In fact, I've heard that the parents can't get them to go to bed on time."

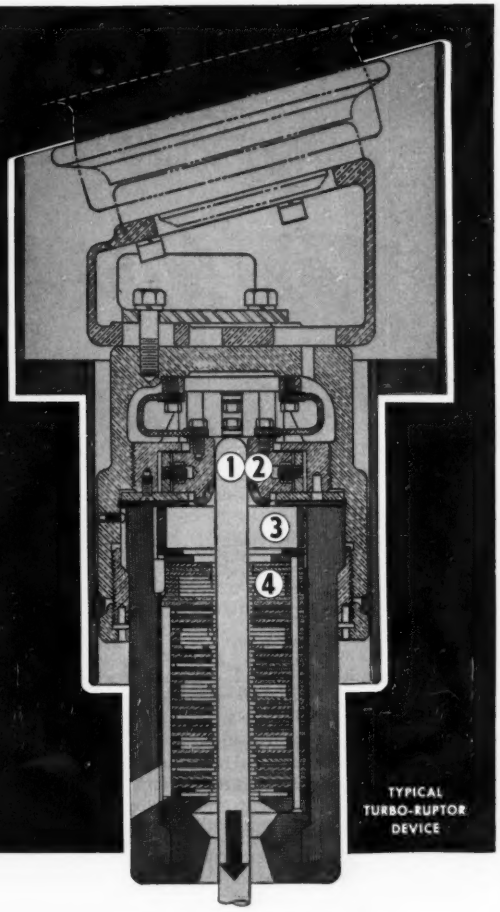
"Are there any parents who can?"

"Well, maybe there are a few cases in which television works out well in the home," said Electra, still unconvinced. "But I still think the evidence proves that it is more of a problem than a pleasure for the woman in the home."

How Arcs Speed Circuit Interruption

IN RUPTOR DEVICES

SIMPLIFIED DESIGN ASSURES HIGH-SPEED PERFORMANCE WITH SHORT ARCING TIME



TYPICAL TURBO-RUPTOR DEVICE

WHEN BAYONET contact (1) drops from the stationary contact (2), an arc is initiated in the oil-filled pressure chamber (3). Pressure from the gas generated by the arc causes the oil to swirl down dual helical throat passages (4). These restricted, converging passages force jets of oil into the elongating arc and against the moving bayonet arcing-tip. This turbulent action disperses the arc and waste products, completing interruption at an early current zero.

The simplified *Ruptor* interrupting device has no moving parts to bind or fail. Stationary contact segments provide self-wiping, high pressure contact with the movable bayonet — for low resistance and low temperature rise.

Check with your nearby A-C representative for the complete story of this feature . . . and others of Allis-Chalmers oil circuit breakers — in ratings to meet all your needs. Or write direct. A-2680

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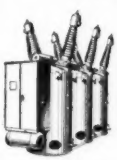
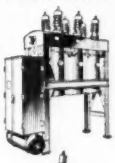
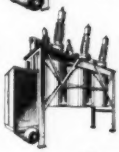
RUPTOR OR TURBO-RUPTOR DEVICES ARE USED ON THESE ALLIS-CHALMERS OUTDOOR OIL CIRCUIT BREAKERS


TYPE BZO-160 . . . 69 kv to 230 kv — 5-cycle opening, 20-cycle reclosing.


TYPE FZO-150 . . . 14.4 kv to 46 kv — 8-cycle opening, 20-cycle reclosing

TYPE FZO-151 . . . 69 kv — 5- or 8-cycle opening, 20-cycle reclosing


TYPE O . . . 14.4 kv to 23 kv—8-cycle opening, 35-cycle reclosing

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Power and communication cables — "underground" for 50 years — report "good news for ORANGEBURG FIBRE CONDUIT."

On inspection ORANGEBURG was found as serviceable—after all this time—as on the day it was installed.

The Electrical Industry has used ORANGEBURG FIBRE CONDUIT as the ideal protection of cables for over 50 years.

ORANGEBURG FIBRE CONDUIT protects cables from 1. Cable Sheath Abrasion. 2. Pulling Tensions. 3. Corrosion. 4. Cable Movement. The protection is all-embracing and lasting.

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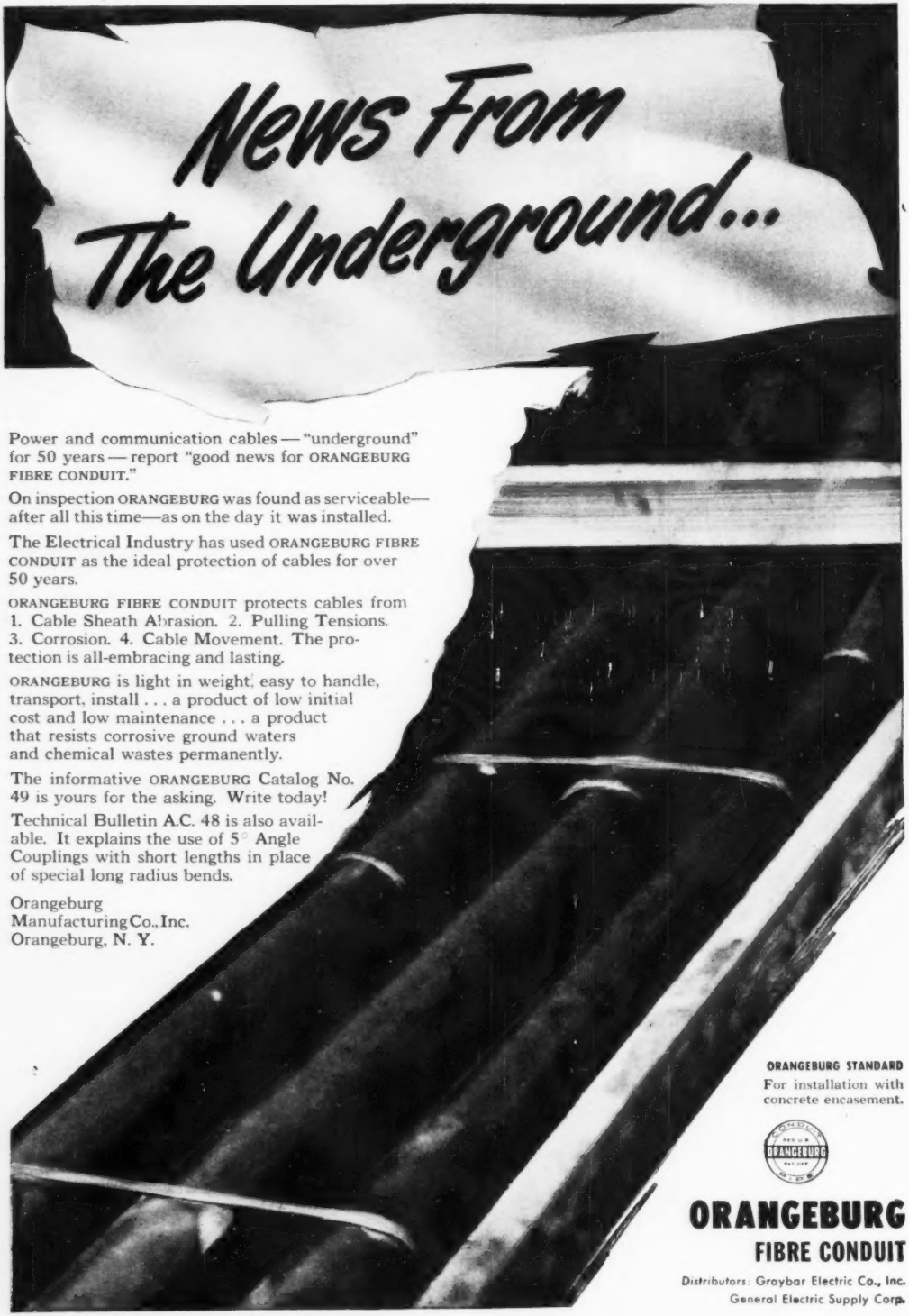
Technical Bulletin A.C. 48 is also available. It explains the use of 5° Angle Couplings with short lengths in place of special long radius bends.

Orangeburg Manufacturing Co., Inc.
Orangeburg, N. Y.



ORANGEBURG STANDARD
For installation with concrete encasement.

ORANGEBURG
FIBRE CONDUIT

Distributors: Graybar Electric Co., Inc.
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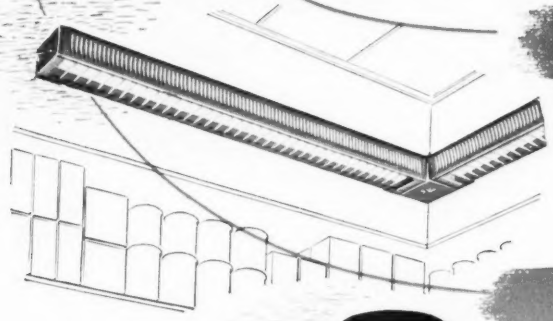
here's the Curtis Trio Everything you need to sell America's biggest market

CURTIS "Store-Liter"

CATALOG 7502-CLH

Yes, the Curtis "Store-Liter" provides unexcelled general illumination . . . it has sparkle and efficiency . . . it produces Vertical Illumination (washes the walls with light) . . . and it is designed for low-cost installation and maintenance. • It utilizes the excellent characteristics of the new 75-watt, T-12, 96-inch fluorescent lamp . . . features instant starting . . . more lumens per foot of lamp, and 96 inches of uninterrupted light per luminaire. • Plastic side panels, achieve a pleasing low-brightness effect while providing brilliant illumination to vertical surfaces such as shelves, counters, mannequins, etc. • America's retail stores are today's biggest lighting market . . . get your share with the Curtis "Store-Liter".



CURTIS "Wall-Strip"

CATALOG No. 53-A

Curtis "Wall-Strip", using one 40-watt T-12, 48 in. fluorescent lamp, is particularly recommended for illuminating shelves, wall cases, etc. It also directs a portion of the light to the ceiling, where it is diffused into the sales area. Can be mounted to the wall at any desired distance from the ceiling, either as individual units or continuous lines. Easy, quick installation and maintenance.

CURTIS "Punchy"

CATALOG No. 2240

A small, highly practical downlight, utilizing one side-prong PAR-38, 150-watt projector flood or spot lamp. Lamp can be adjusted, from the floor, to any angle 0° to 35° from vertical and 0° to 360° horizontal. Provides punch lighting for counters, show cases, mannequins, and other areas where "Attraction Zone" lighting will give maximum sales appeal to merchandise.

CURTIS LIGHTING, INC.

6135 WEST 65th STREET, CHICAGO 38, ILLINOIS

CHICAGO . . TORONTO . . NEW YORK

for Modern Store Wiring

Modern wiring methods and General Electric wiring materials go hand in hand. The "old stand-by" products and the exciting, new items make up a complete line that covers any type of modernization job you may want to do. Here's how a few of these G-E materials can help you make an old store new:

1. NEW G-E REMOTE CONTROL wiring system can save a good many steps for a hard-working merchant. Master control panel can put switches for spotlights, general lighting, display cases, and windows at any convenient point. Individual switches can be located near the lights they control and any other points in the shop. This new system goes in easily, economically, in new or remodelled stores. Trim low-voltage control wire makes a neat surface installation — small switches, the compact remote control relay, and a transformer fit in, even where space is limited.

2. G-E FIBERDUCT RACEWAYS can give a shop like this complete flexibility of layout — permit the shopowner to move displays, freezers, desks, counters, and departments without elaborate electrical work. An over-all pattern of General Electric Fiberduct underfloor raceways can be installed in old buildings as well as new. With this system, new outlets are added easily and quickly by pulling wires through inserts and installing outlet fittings.

FLAMENOL* TYPE TW WIRE — the small-diameter, Flamenol building wire that's made by General Electric — is right for commercial buildings of all sizes and types. For a store of this kind, Flamenol Type TW can speed installation, because it's small in diameter, smooth-finished. On remodelling jobs Type TW increases the number of wires that can be installed in existing raceways.

4. CONDUIT you can depend on for years of service life is, as always, General Electric white or black rigid conduit. Use either G-E "White," the hot-dipped galvanized, Glyptal* lacquered conduit, or G-E "Black" — the conduit with the protective coat of tough enamel. Both give the kind of protection you need.

5. FLUORESCENT FIXTURES, too, do a dependable day-in, day-out job of store lighting when they're equipped with General Electric wiring materials. Although General Electric does not manufacture fixtures, you'll find that many fluorescent fixture manufacturers equip their units with General Electric materials. Check the fixtures you buy for heat-beating Deltabeston* Type AF fixture wire and General Electric Turret* lampholders. Make sure the fixture you buy has General Electric Watch Dog* starters, and put Watch Dogs on your list as a replacement "must."

On any wiring job, see your General Electric construction materials distributor. He's a good source of advice and he can supply the materials you need to do your job best. For information on General Electric construction materials, write to Section K20-525, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

*Trade-mark Reg. U. S. Pat. Off.

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ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

The Pacific Northwest Suffers from

FEDERAL POWER POLITICS

Hon. Ben F. Jensen*

Member, House of Representatives
7th Iowa District

TWO kinds of greed, the greed for power and the greed for money, have brought about a strange mating of political forces and money forces in the Pacific Northwest.

From the matters I am about to reveal, it will soon become apparent that a gang of Wall Street promoters has joined hands with the forces of American socialism to socialize the electric power industry of the great Pacific Northwest country — for the money benefit of the first group, and for the political benefit of the second.

This socialization is to be accomplished at an inflated price—at a price which will load the people of the region with a huge load of unnecessary and wasteful bonded debt—at a price made possible only by the device of robbing the federal treasury of tax revenues amounting to millions of dollars a year.

The device is to snatch away from the users of electricity all of the electric rate benefits that should come with tax exemption, and hand these benefits over to the Wall Street owners of the common stocks of the electric companies which are being socialized.

How rich a dish the promoters share is apparent from the fact that the promoter extraordinary, one Guy C. "Flash" Myers, recently had pending in the tax courts of the United States a $300,000 tax evasion case, covering just two years of his "take."

The Internal Revenue Bureau alleged that promoter Myers attempted to dodge payment of more than $300,000 due the United States government on his 1940-41 income tax. Myers tried to talk himself out of paying that tax on the grounds that he had spent years promoting various public ownership deals in the states of Washington and Nebraska. He claimed that the huge income he received in 1940 and 1941, when the deals finally paid off, should be spread back over a long period, clear back to 1934, when he first smelled the chance to make himself a multimillionaire at the expense of the taxpaying public.

His racket is to capitalize the tax savings by issuing tax-exempt bonds against these savings, and hand the proceeds (less a fat commission) over to the Wall Street owners of the common stocks of the electric companies which are being socialized. (See box.)

Take the Puget Sound Power & Light Co. deal, for example. That company now pays the government about $2,500,000 in federal taxes every year. And once you understand the game, it is easy to see how Myers can offer 30 or 40 million dollars of extra profit to the owners of the company.

It is a slick trick, a very slick trick. And I think Mr. Myers himself must wonder sometimes why the public hasn't caught onto it long before now.

One reason the public hasn't caught on, of course, is the smoke-screen of confusion which has been spread by the shrewd and skillful agents of power socialism. . . .

What a picture! The Pacific Northwest was taken for a ride by Wall Street in the 20's. Its private utilities, with scandalous write-ups, were sold into great holding company mergers. The stock was watered. Some of the stock wasn't worth 10 cents on the dollar in earned value. That money is gone. Wall Street got it. Wall Street kept it. And now, by grace of Harry Truman and his Administration, Wall Street is going to collect double. The PUD revenue bond deals that are pending out there will bail out the holding companies for all the foolish money spent.

Nobody will suffer—nobody except the people of Washington and the little guy who has to dig down a little deeper into his own pocket to pay taxes to the federal government. Nobody will profit — nobody except the Wall Street promoters.

Puget Sound Power and Light Co. was valued in 1944 at $90 million cash. Inventory of eight and a half million dollars brought the price to $98.5 million. This is not my word, but the word of Dr. Paul Raver, Bonneville administrator. In 1945 Guy Myers, on behalf of a public utility district in Skagit County, Wash., offered to buy the property for $135 million. Certainly a watered deal if there ever was one. The Supreme Court of the state of Washington refused to allow this sale because Skagit County would become owner of property far beyond its boundaries and the state law at that time permitted purchase of properties only within the district's own territory.

At the beginning of this year Guy Myers and his hungry heelers loaded with swag-bags, moved into the Capitol building at Olympia, Wash., and lobbied through a law which would legally permit this deal. At the same time it would allow Howard Aller, president of American Power & Light Co., to unload the common stock of Washington Water Power Co. at double the amount it is carried on the books of the company. But the swag would not end there. Aller also owns the Pacific Power & Light Co. with large properties in the state of Washington, which would be subject to the same kind of inflationary sell-out scheme.

All of these deals would be cooked up in a back room somewhere. The huge bond issues to finance them would never be put to a popular vote,

* From an address in the House of Representatives, March 29, 1949.

because the law of Washington, like the law of Nebraska, allows public utility district bonds to be sold privately, without an election and without competitive bidding. That is a good thing for the promoters of these deals, because all the recent public ownership elections out in Washington have shown pretty clearly that the voters are beginning to get a bellyful of power socialism.

But the people there are confused by the way Guy Myers juggles millions and millions of dollars. His hand is quicker than the public eye. They have been drugged with the ceaseless cry that public ownership is "inevitable."

Persistent propaganda has led honest believers in the free enterprise system to begin thinking that *maybe power socialism is different, in some strange and unexplained way, than socialism itself.*

The same persistent propaganda has caused equally honest believers in public power to let themselves be used as tools of Wall Street—to be used as respectable "front men" for the financial racket of a kind that we thought had been stopped when the Securities and Exchange Commission was organized.

What these people do not realize is that the oldtime financial racketeers have simply moved over to the public ownership side of the street—the *unregulated* side of the street—the *unregulated* side of *Wall Street!* . . . .

Was the Holding Company Act of 1935—fathered in this House by our distinguished Speaker, Mr. Rayburn, who at the time was chairman of the Interstate Commerce Committee—was it intended to bail out the overcapitalized holding companies which headquarter in Wall Street? Was it intended to put public bond issues back of watered stock? Was it intended to substitute political holding companies for financial holding companies?

Is the SEC breaking up the public utility holding companies just to fatten the wallets of the men who made fortunes by putting them together in the first place?

From the standpoint of the little fellow who pays the bill, is there a particle of difference between a watered public utility district bond issue, floated by Guy Myers, and an issue of watered holding company stock? In principle, no—but in actual practice, yes. The Securities and Exchange Commission has been squeezing the water out of the holding company stocks, to protect the consumer, but no one can squeeze the water out of a PUD bond! There's no way to put the public bonded debt through the wringer!

The amazing, the shocking thing about it all is that the indispensable tool and instrument of the Myers' racket is the Bonneville Power Administration, and, by the same token, Guy Myers is the most important single factor in BPA's power socialization program. . . .

Wants to Shed Controls

The Bonneville Power Administration, as everyone knows, is regarded by its masters as merely an interim agency—an interim agency which up to now has unwillingly had to permit private enterprise in the electric field to live under a sword that hangs by a thread. It is an interim agency which is very impatient with the legislative processes of the Congress. It wants to be turned loose from any Congressional controls, wants to be the complete and undisputed master of the Pacific Northwest region. That is why the BPA, the Interior Department and all the motley forces of Marxism are now centered on a thrust to reach their objective through a Columbia Valley Authority.

Once they get a CVA, if they do, you will see the same forces moving with increased strength to take control of the Missouri Valley, the Central Valley of California, the Colorado, the Arkansas, the Rio Grande—the whole of America west of the Mississippi River. And preceding them will be Guy Myers, stirring up the public confusion which is so essential to the success of his money racket—and also to the advance of Marxism!

These are serious charges which I make, and I make them most seriously, because I have the proof to back them up. The court records in the Guy Myers tax evasion case are available which prove in his own words how he has been master-minding the PUD movement in the state of Washington since its inception.

Also in my possession is the report by Robert E. Lee on the Bonneville Power Administration. Because of the length of the transcript of the Myers' tax case, which would run into scores of pages of the Congressional Record, I will not submit it for publication at this time. But in the matter of the Robert E. Lee report, I submit it in full for the benefit of the doubting Thomases who cannot believe that such things be. I further submit the reference to page 113 of the Interior Department hearings for the Appropriation Bill, 1950, Dr. Raver admits the authorship of the letters attributed to him.

Under the provisions of the Reorganization Act of 1946 Mr. Lee was serving at the time as chief of the Investigative Staff of the Appropriations Committee. Mr. Lee was not a Republican appointee. He was originally employed in 1944 by the Appropriations Committee under the chairmanship of the present chairman of the Appropriations Committee, Mr. Cannon. He came to the Appropriations Committee on loan from the Federal Bureau of Investigation on the highest recommendation from J. Edgar Hoover because of his brilliant career in that organization as an investigator.

The Bonneville Report by Mr. Lee is an objective appraisal of the political activities of the BPA to which I suggest every member of this House should give full and serious concern.

Out of this factual memorandum I will select one letter. It is directed to C. G. Davidson, assistant secretary of the Interior, by Dr. Paul Raver. In this letter, by implication, Raver admits his own violation of his oath of office under the Hatch Act, and, also by implication, he draws in "Jebbie" Davidson. Here's the letter to "Jebbie" from Raver, signed by Raver, and dated July 15, 1946:

"I received your note while I was on my vacation and have turned it over to Bob Willard (former acting general counsel of the BPA, now with the Atomic Energy Commission) to formulate a reply for Cap, setting forth the minimum requirements for a private utility company contract.

"As to Loring (refers to Mr. Marlett, assistant to Dr. Raver) and I coming to Washington immediately, we realize the importance of having someone there during the formative period of your organization problem but it is simply out of the question for us to come down until we have formulated certain programs, which we have been working on strenuously the last few weeks.

"These three programs are as follows:

"1. Revitalizing the public power movement in the Northwest. Henry Alderman is heading this up and has the program pretty well outlined and we are working on it at the present time."

Who is Henry Alderman? Before the war he used to be on the publicity staff of the BPA. Then he had some kind of a job with a magazine. Then he came back to Raver as his administrative assistant.

"2. Our long-range as well as 1948 construction program. On this I have insisted that our engineering and system planning organizations tie down a generator installation schedule with the Army Engineers and Bureau of Reclamation for new dams on the Columbia and lay out our program for transmisson line construction up to and including 1955 with plans for southern Idaho projected to 1965. Both of these forecasts of generator installations and transmission line construction, of course, are tied in with our load forecast for the region. I see no point in coming to Washington to talk about coordination until we are prepared to present a coordinated plan which can be used as a basis for such orders of the Secretary as he deems necessary to carry out the coordinated construc-

Here is the Way it Works

Here is the way Guy Myers' tax-capitalizing device works. Suppose I have a business that is worth only $100,000 on the basis of its net earnings, after taxes. And suppose that business is now carrying $2,400 a year in federal income taxes as part of its operating expenses.

Now suppose some smart fellow comes along and says to you: "Look, you've got a nice little business here, and I know how you can get a fancy price for it. I've got a client who doesn't have to pay federal taxes, and he's very anxious to buy you out. If you sell it to a taxpayer like yourself, you know very well that all you can get for it is $100,000, because that's as big an investment as it will carry.

"But, if you will sell it to my tax-free client, he can take the $2,400 a year you now pay Uncle Sam, and use that money to pay interest on a much bigger investment. That $2,400 will pay six per cent on $40,000, which means that he can make the business carry an investment of $140,000 and still show the same net return.

"So here's what we can do. I'll get my client to pay you $130,000 for the business, and pay me $10,000 for fixing up the deal, and we'll both make a nice piece of change!"

Yes, that is exactly the way Guy Myers works up his deals to sell electric power companies into socialism! Only he isn't working for small change. He is dealing in millions and hundreds of millions, and his commissions run into seven figures.

tion plan, assuming, of course that he agrees that our plan is feasible.

"3. With these two programs as a basis, we will also be in a position to present to the Coordination Committee and to the Secretary, if it seems desirable, an organization plan to carry out the construction and operation program.

"All three of these programs are shaping up very rapidly and Loring expects to be in Washington on July 24. I will arrive there Sunday night, July 28.

"Loring, Henry Alderman, Frank Ward and I have been working on the first step of our public power program today in Seattle. This program involves pulling together all of the public power forces of the region around an agreed program of public ownership and public acquisition of private utility company properties. As discussed with Cap, it involves fitting municipal ownership program with REA development in the rural areas into an existing PUD plan and enlisting the support of the PUDs in carrying it out. In order to do this we are trying to work it out in harmony with plans of Carstensen and the Washington Grange so as not to upset their existing plans for private utility acquisition in the Puget and Washington Water Power Co. areas."

Please note Loring, Marlett, Henry Alderman, somebody named "Frank" and Raver have been working on the "first step" of Bonneville's—they admit it here and now—public power program. Note too this program involves "pulling together" all of the public power forces in the region around an agreed program of public ownership and acquisition of private utility company properties. This statement makes it necessary for Dr. Paul Jerome Raver to do a mighty lot of explaining.

Time and again he has denied on the witness stand that his purpose in the Northwest was more than to give countenance to the public ownership program; to give information and have available to the normal forces seeking public ownership. I could cite chapter and verse, year after year, beginning even before my time in Congress, when Raver disavowed the very thing that he betrays and spells out in this letter to his Department of Interior boss.

Let us continue:

"As discussed with Cap, it involves fitting municipal ownership program with REA development in rural areas into an existing PUD plan and enlisting the support of the PUDs in carrying it out."

Now who in the world could "Cap" be? Secretary of Interior Julius Krug is commonly known to his friends as "Cap." Cap was in on the deal too—whoever Cap is—possibly Krug, possibly some less distinguished personage.

Let us turn to the next paragraph:

"We reviewed this program at some length with Tomkins (Mort, master of the Oregon State Grange) in Portland last Friday. He realizes the critical situation of the public power program at the present time, particularly in the state of Oregon, and felt that our approach was sound but desired to check it with his executive committee before making any definite commitments. I told him I was planning to discuss the program with Carstensen (master of the Washington State Grange) in Seattle today and wanted to be sure that we had the full and wholehearted support of the granges of both states on any program that we worked out. Tomkins called Carstensen after our meeting and reported to Hank that Carstensen was receptive to working out a cooperative program but was adamant in his opposition to mixing up a municipal ownership campaign with his plans for acquisition through PUDs. He stated that Carstensen was not interested in a municipal ownership campaign until after he knew the outcome of the election on Initiative 166 (this was a measure to provide for a vote of the public before revenue bonds were issued for the acquisition of private property. It was defeated.)

Now who is this Mort Tomkins? He got into state politics in Oregon, and into Grange politics. He became overseer of the Oregon State Grange, and when the Bonneville Power Administration was formed he got on the federal pay roll as a field agent for BPA. His duties seem to have been principally to travel over the state and help with the organization of PUDs.

After three or four years of this, he got himself elected master of the Oregon Grange, a salaried position, and was presumed to have severed his connection with the Bonneville pay roll. But what did we find during the 1948 Interior Appropriations hearings? We found that Mort Tomkins was still drawing money from BPA as a "consultant"—that he was on the federal pay roll while taking part in many types of political activity.

Suppose it had come out that Tomkins had been on the secret pay roll of a private power company while serving as the salaried head of a farm organization which we all respect? What a scandal that would have been to the membership!

We don't know that Carstensen ever received any money from BPA, but his sustained interest in the Guy Myers schemes to switch ownership of $200,000,000 of electric properties might bear looking into.

"We met with Carstensen at 10:30 this morning and I outlined the following situation to him: If the court case (now set for hearing on Sept. 2 with a promise that the decision will be rendered within ten days of the hearing) is favorable to the PUDs, then the Puget deal must be made prior to Dec. 15 if Initiative 166 carries.

"Carstensen stated that he was confident the court case would be favorable and that the deal would be made before the election on Initiative 166. He also stated that the Washington Water Power deal was already made and that the real purpose of the court case was to clear the way for making the Washington Water Power deal. They had expected to have the court case decided in May and the Washington Water Power deal out of the way before this time."

The next three paragraphs of Raver's communication to his boss, "Jebbie" Davidson, require some background explanation to make them meaningful, and to show how BPA is being so helpful to the Guy Myers boodle-bund.

Common stock control of both the Washington Water Power Co. and the Pacific Power & Light Co. is owned by a New York holding company, Amer-

ican Power & Light. That holding company, like others, is under orders from the SEC to dissolve. A constructive dissolution program would simply divorce the Washington and Pacific companies from their parent, and establish them as independent, locally controlled enterprises. This was and is the purpose and intent of the Holding Company Act, under which the SEC is proceeding.

Solution Unwelcome

The Bonneville power socialists and their assorted allies don't want such a constructive solution to come about. They don't want their political power satellites to have to meet the competition of streamlined and efficient private power companies. They want the SEC to be an instrument of destruction to free enterprise, not constructive regulatory force. In brief, they are deathly afraid that their watered-down brand of socialism can't stand up by itself under the test of time. So they want to wipe out private power and municipal ownership in the Pacific Northwest—now!

Neither does Guy Myers want the SEC to order American Power & Light to turn its captive companies free. Myers wants the SEC to close its eyes to the public interest, and to the interest of the men and women who have spent their lives building up efficient public service enterprises, and allow him to hand millions of dollars of unearned profit to the holding company —millions of dollars which must come out of the pockets of users of electricity in the state of Washington.

Myers does not want the Washington and Pacific companies to become independent enterprises, completely subject to regulation by the states in which they operate. He wants to retain the ability to make a deal with one man—one man alone—Howard Aller, the head of American Power & Light. He wants to make that deal so that he, Guy C. Myers, can add another two or three million dollars to the million or so he already has made on similar deals. Aller would like to make the deal so he can turn his watered stock over to the public, in exchange for cold, hard dollars which would come from PUD bond issues, paid for by the people.

So you can see how perfectly the Myers financial game ties in with the BPA - Interior political game. What could be better for Myers than to have an important and influential department of the national administration urging the SEC *not* to compel Aller to free his captive companies?

I, for one, cannot believe that the Securities and Exchange Commission of the United States will allow itself to be so used by political power grabbers.

Now to continue with Dr. Raver's letter:

"I told him if this was the situation that he should use every effort to stop or at least delay the merger of Pacific Power & Light and Northwestern Electric until after the court decision, otherwise the Washington Water Power deal, which he claims is already made, would no longer be effective since Washington Water Power would be out from under Electric Bond & Share at the same time P.P. & L. and N.W.E. are merged. I am not sure that Washington Water Power will be divorced from the holding company at the same time N.W.E. and P.P. & L. are merged, but I do know that the plan is for Washington Water Power to acquire controlling interest in the common stock of the merged corporation.

"I pointed out to him that in my opinion the N.W.E. and P.P. & L. merger was being slipped through without the public realizing that it was only the first step in the further integration of operating companies in the area using Washington Water Power Co. as the original holding company and that subsequent steps might well include the Portland General Electric whose common stock, as a result of the reorganization of Pepco, was widely scattered in the hands of income bond holders and might well be acquired, as far as the controlling interest is concerned, by the new merged corporation or by the Washington Water Power Co. Furthermore, I pointed out to him that the company might be gambling that the court decision would be favorable to them and they could then step in, bail out Frank McLaughlin at $18 per share for the common stock of Puget and thus very quickly set up a major public utility company monopoly that would control the entire power development of the Northwest from here on out.

"This analysis was evidently new to Carstensen and he readily agreed to do anything we thought advisable to stop it. I suggested a number of hedges or efforts which various groups could make to stop or at least delay this merger until after the fall elections.

"1. Contact Governor Wallgren and ask him to telegraph the SEC to delay proceedings until such time as the state had had an opportunity to examine the implications of this merger. Henry readily agreed to this and suggested that the Governor might have his advisory commission study the matter. Henry felt that he could enlist the support of McLaughlin and Hemphill, who are members of this commission, in formulating a protest because of the disadvantages to the development of the state and the development of its resources if the transmission and distribution of government power came under the control of one large private utility monopoly. Carstensen agreed to take this up with the Governor tomorrow. It was also pointed out that the merger would probably have to come before the State Public Utility Commissioner for approval and the Governor would have an opportunity to discuss the matter with his own Public Utility Commissioner.

"2. I suggested to Carstensen that I explore the possibilities of developing municipal ownership programs in the cities of Spokane, Yakima and Walla Walla. He objected strenuously to starting anything in Spokane on the basis that the Spokane City Council has agreed to take no formal action on municipal ownership until the Washington Water Power deal is actually made and that the city council and the Grange leaders have agreed to let the people in Spokane decide for themselves whether they desire municipal ownership for a PUD after the deal has been made. Of course, he has stated unequivocally that this deal has been made with Aller and, therefore, he is quite anxious to stop this merger which presumably would take the properties out from under the control of Aller until after the court decision (which he expects to be favorable) at which time, according to Carstensen, the Washington Water Power deal will be made even before the Puget deal. Inasmuch as Carstensen maintained that, if the city of Spokane voted for municipal ownership, the Washington Water Power deal would be killed, I agreed with him not to promote municipal ownership with the city council in my meeting with them next Tuesday morning. Consequently, I wish that you would have Cap check with Calder (chairman of the Board of Electric Bond and Share Co.) and see if he can get the facts about Washington Water Power deal. It may be well that Carstensen has been mislead by Meyers about the deal and, if so, we should know about it and then be free to enlist his help or at least his consent in going ahead with the municipal ownership program in Spokane.

"He also objected to our promoting municipal ownership in Yakima 'at this time' but on a different basis. He stated that in his opinion two of the commissioners of the Yakima PUD are strong for public ownership in Yakima County and that they have been misunderstood in their position because of a Grange fight which arose out of the Grange people trying to dictate to the newly elected commissioners what their position should be with respect to the sale of this property by P.P. & L. Carstensen felt that it would be very bad at this time to support municipal ownership in Yakima as it would only tend to cause a wider rift between the commissioners and some of the Grange officials and other public power supporters in Yakima. He stated that he was trying to pull all the public power forces together and he felt confident that all parties would be served best by having the PUD take over instead of municipal ownership. He also stated that he was confident that a new PUD commissioner would be elected this fall who is a strong supporter of acquisition."

I ask you to read the further evidence of connivance to defeat the will of the people of the United States in the following three paragraphs. They are self-explanatory.

"He also stated that the present PUD commissioners had determined that, if municipal ownership agitation started in Yakima, they would institute condemnation proceedings against P.P. & L. in order to stop it. I made no definite comments about this except to state that we would not want to do anything to cause a break in our public power forces and wanted to pull them together. My own feeling is (although I did not express it to Carstensen) that some more individual work will have to be done on the situation with Carstensen and other public power leaders in the Yakima area before municipal ownership can be developed there with any possibility of success.

"In both the Spokane and Yakima situations, Carstensen agreed that if they were unsuccessful in fighting Initiative 166 this fall (or in the case of Yakima, in electing a friendly PUD commissioner this fall) that he would come all out for a strong municipal ownership campaign because, as he stated it, the PUDs were on their last legs

and they either had to win this fight or try some other alternative to accomplish the acquisition of the private companies in this state.

"We then discussed the Walla Walla situation and Carstensen agreed that municipal ownership in Walla Walla could go ahead without interfering in any way with their PUD program. I requested that he support municipal ownership in Walla Walla if the city council decided to put it on the ballot this fall, but he gave no commitment as to his support."

Dr. Raver's request for help in promoting municipal ownership in Walla Walla takes on greater significance when tied in with the fact that the Bonneville Power Administration maintains a costly and unnecessary district office in that city, and when tied in with the further fact that BPA's district manager, H. R. Richmond Jr., has long been busy with various schemes to break down that community's stalwart resistance to the socialization of its electric service.

Abortive Co-op

It is a matter of public knowledge that Richmond, a year before Raver wrote his intimately revealing letter to "Jebbie," had been active in the organization of an abortive electric co-op, intended to sneak public ownership into Walla Walla via the back-door route. It is also a published fact that he and one Charles Luce, then Bonneville staff attorney for the district, a few months later helped organize Interstate Electric Inc., a Guy Myers type of "non-profit" corporation, created for the announced purpose of buying the Pacific Power & Light Co. system, and then picking it apart.

In Dr. Raver's own words, testifying before the Securities Subcommittee of the Committee on Interstate and Foreign Commerce on Jan. 29, 1946, Interstate Electric was, and I quote, "a pure legal fiction and a device to accomplish an end."

When Dr. Raver's legal fiction failed of its purpose, we find him turning to the king-pin of the Myers public ownership group for permission to go ahead with an attempt to start a municipal ownership program in Walla Walla.

I refer to the following paragraph in Dr. Raver's letter particularly because of its reference to Nick Bez, the RFC beneficiary:

"We also discussed with Carstensen certain other alternatives that need to be pushed now in order to strengthen the public power situation in the Northwest and help defeat the merger. I pointed out that, while the possibility of a competitive system in The Dalles and the existing competitive situation of the Hood River co-op were Oregon developments, they had a bearing upon the situation in the state of Washington because they were in P.P. & L. territory and that, therefore, the Grange should give its moral support and any other support that it could to these developments. Similarly, we pointed out that a PUD election in Clatsop County (Astoria) was coming up on the fall ballot and that the leaders in the Oregon Grange felt that, if sufficient effort were placed on winning this election, they had a very good chance of winning it. I suggested to Carstensen that inasmuch as Nick Bez is a member of the Governor's Advisory Commission and (according to Carstensen) is a strong supporter of PUDs, that he might try to enlist the assistance of Bez in the problem of getting the issues properly before the people in Clatsop County.

"I mentioned also that Benton County had received an award of 1¾ million dollars and had been promised financing by Hassock. Carstensen's reaction to the Benton County award was that it was too high and that the PUD would find itself in the same embarrassing condition that Okanogan County finds itself in today as a result of paying too high a price for its properties. I did not mention to Carstensen the inconsistency of his position on the question of price."

You will note the statement that "the leaders of the Oregon Grange felt that if sufficient effort were placed on winning this election, they had a very good chance of winning it." That was a PUD election in Clatsop County, Ore., and the top leader of the Grange was the very same Mort Tomkins who was drawing pay from Bonneville in the guise of a "consultant." I am happy to be able to say that in spite of this web of intrigue, this use of taxpayers' money and of federal influence, the voters of Clatsop County said emphatically that they were against power socialism. . . .

"I told Carstensen that certain groups in Portland were interested in circulating a referendum petition when and if the city council acts favorably upon the N.W.E. and P.P. & L. application for city approval of their merger plans. Incidentally, Commissioner Lee made a statement in the Sunday morning paper to the effect that she had examined the proposed merger of the two companies and felt it should be approved by the city council because it would result in refinancing the company on a lower interest rate. Our information is that a referendum requiring the city council's action to be submitted to the voters for approval can be secured by a petition containing 2,000 signatures in the city of Portland.

"When I told Carstensen about this possibility of delaying the merger proceedings, he inquired as to the possibility of getting an initiative petition circulated and signed up in the city of Portland for municipal ownership or for a PUD in time for the fall election. I indicated to him that I was not informed as to the number of signatures required but that I would look into this possibility purely as a delaying tactic and not with any feeling that such an election could be carried through to a successful conclusion."

I leave the following paragraph as it stands with its own reference to Bonneville Administration's violation of Section 9(a) of the Hatch Act:

"I neglected to mention in the proper place that Carstensen is having a meeting in Wenatchee on Monday, July 22, of all organizations interested in defeating Initiative 166. He expects to have the A. F. of L., the Public Power District Commissioners' Association and the Grange as well as certain municipalities represented at this meeting. He proposed to have each of the organizations represented there send telegrams to the SEC protesting against the merger plans and asking for hearings on these plans in the Northwest. It is our feeling that, if these hearings can be held in the Northwest, they can be used as a good public forum on the whole public power issue, including the basic points in Initiative 166."

I refer you to Section 9(a) of the Hatch Act, which reads as follows:

"Section 9(a). It shall be unlawful for any person employed in the executive branch of the federal government, or any agency or department thereof, to use his official authority or influence for the purpose of interfering with an election or affecting the result thereof. No officer or employee in the executive branch of the federal government, or any agency or department thereof, shall take any active part in political management or in political campaigns. All such persons shall retain the right to vote as they may choose and to express their opinions on all political subjects. For the purposes of this section the term 'officer' or 'employee' shall not be construed to include (1) the President and Vice-President of the United States; (2) persons whose compensation is paid from the appropriation for the office of the President; (3) heads and assistant heads of executive departments; (4) officers who are appointed by the President, by and with the advice and consent of the Senate, and who determine policies to be pursued by the United States in its relations with foreign powers or in the nation-wide administration of federal laws.

(b). Any person violating the provisions of this section shall be immediately removed from the position or office held by him, and thereafter no part of the funds appropriated by any Act of Congress for such position or office shall be used to pay the compensation of such person."

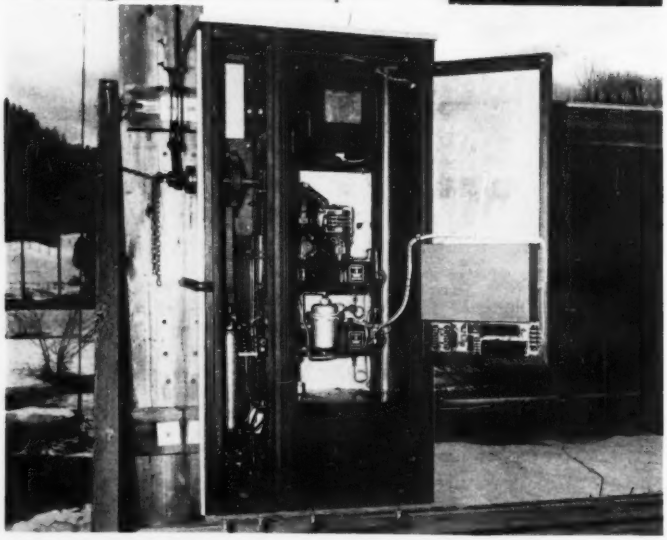
I have submitted and discussed the letter from Dr. Raver to his boss, Davidson, assistant secretary of the Interior, a letter which Raver admits having signed and sent. Taken in its entirety it reveals a prima facie case of law violation by the Bonneville Administration at the highest levels.

It reveals that an important agency of the federal government, the Bonneville Power Administration, is deeply involved in political shenanigans, and is contributing to the enrichment of a group of Wall Street promoters and Wall Street holding companies, at the expense of the federal taxpayers and of the power consumers of the state of Washington.

It is shocking and scandalous that the same holding companies should today have the aid of public officials in unloading these high-priced stocks back on innocent people in the form of inflated revenue bonds.

It is shocking, I repeat, and scandalous.

Electrical West—Vol. 102, No. 5



Automatic Air-Break Sectionalizing Switches

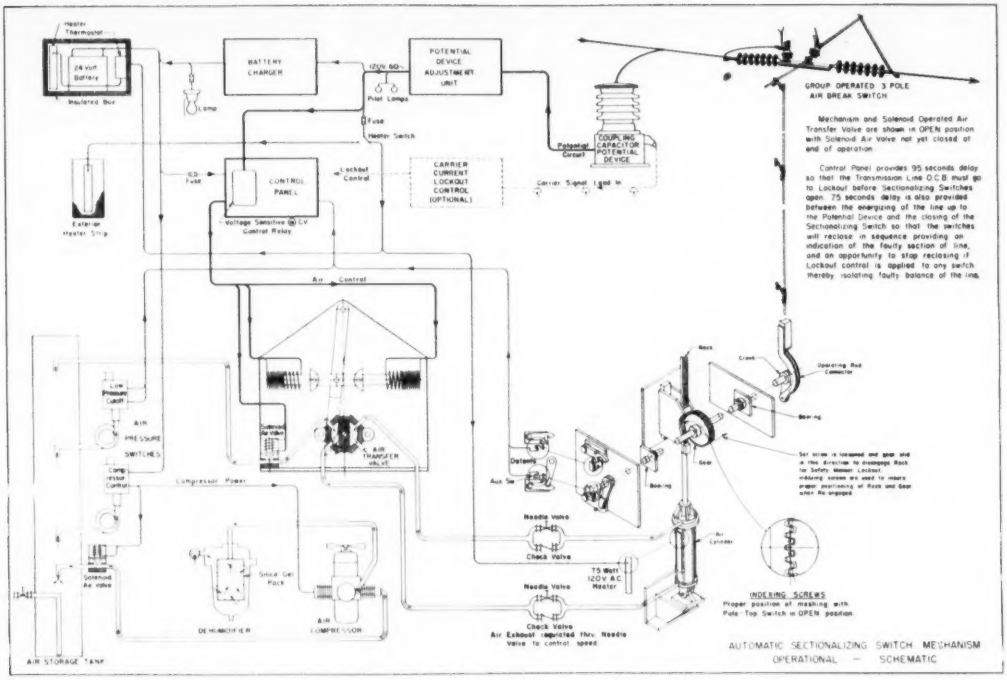
Leonard G. Walker

Idaho Power Co., Boise

TO provide adequate power for expanding mining operations, the Idaho Power Company constructed, in 1943, 106 miles of 69-kv. wood-pole H-structure transmission line to Stibnite, Idaho, producer of over one-half of the domestic supply of tungsten during the war. This line traverses some of Idaho's most rugged wooded mountain terrain, in places over 8,000 ft. elevation, where temperatures of −40° and over 6 ft. of snow are not uncommon, and where roads may be blocked and communications cut off, isolating whole communities for days. Sectionalizing this line, isolating trouble and restoring service during winter months, produces almost insurmountable obstacles.

The answer to this problem was the development by Idaho Power Co. engineers of an automatic sectionalizing mechanism which has been applied to the gang-operated pole-top switches installed at five points along the line. This apparatus obtains line-voltage indication and power from a capacitor potential device connected ahead of each switch. Utilizing pneumatic power with electrical control, the mechanism opens the pole-top switch approxi-

Automatic sectionalizing switch on Idaho Power Co. 106-mile, 69-kv. Stibnite line. Trouble can be localized in eight minutes while manual sectionalizing and isolation by showshoe or Sno Cat and truck patrol may exceed 18 hours. Mechanism for air-operated sectionalizing switch (below). Air compressor is battery operated. Batteries are charged intermittently by power from capacitor potential device. Mechanism will operate at 50° below zero


Heater Thermostat
24 volt Battery
Insulated Box
BATTERY CHARGER
120V 60~
Pilot Lamps
Fuse
Heater Switch
POTENTIAL DEVICE ADJUSTMENT UNIT
COUPLING CAPACITOR POTENTIAL DEVICE
Potential Circuit
Carrier Signal Lead In
GROUP OPERATED 3 POLE AIR BREAK SWITCH
Mechanism and Solenoid Operated Air Transfer Valve are shown in OPEN position with Solenoid Air Valve not yet closed at end of operation.
Control Panel provides 95 seconds delay so that the Transmission Line O.C.B. must go to Lockout before Sectionalizing Switches open. 75 seconds delay is also provided between the energizing of the line up to the Potential Device and the closing of the Sectionalizing Switch so that the switches will reclose in sequence providing an indication of the faulty section of line, and an opportunity to stop reclosing if Lockout control is applied to any switch thereby isolating faulty balance of the line.
CONTROL PANEL
Lockout Control
CARRIER CURRENT LOCKOUT CONTROL (OPTIONAL)
Exterior Heater Strip
Voltage Sensitive 60 CV Control Relay
Air Control
Low Pressure Lockout
AIR PRESSURE SWITCHES
Compressor Control
Compressor Power
Solenoid Air Valve
AIR TRANSFER VALVE
Rack
Crank
Operating Rod Connector
Bearing
Gear
Detents
Aux Sw
Needle Valve
Check Valve
Air Cylinder
Set screw is loosened and gear slid to the direction to disengage Rack for Safety Manual Lockout. Indexing screws are used to insure proper positioning of Rack and Gear when Re-engaged.
75 Watt 120 V AC Heater
Silica Gel Pack
DEHUMIDIFIER
AIR COMPRESSOR
AIR STORAGE TANK
Air Exhaust regulated thru Needle Valve to control speed
INDEXING SCREWS
Proper position of meshing with Pole Top Switch in OPEN position
AUTOMATIC SECTIONALIZING SWITCH MECHANISM
OPERATIONAL — SCHEMATIC

mately 90 seconds after line voltage fails and closes it approximately 75 seconds after voltage returns. The 3-shot, 60-second sequence recloser on the station breaker must therefore lock out before the switches open. When the breaker is closed, the line sections pick up at 75-sec. intervals until the faulty section is connected, again tripping the breaker. Timing, together with observation of the line-charging current, permits the operator to determine which switch picked up the faulty line section. After a delay to allow the switches to reopen, the process may be repeated and a carrier-current device may be used to lock out the proper switch, isolating the trouble and restoring service to the good section of the line. The same carrier-current device also may be used to remove the lockout and conduct further tests.

The small output from the capacitor potential device charges a 24-volt battery which provides control power and operates an air compressor. This arrangement is required to provide a safe reserve of stored energy under all conditions of line outage.

The entire design was carried out with −50° F. as the prime operating hazard, since heating of the entire mechanism was impossible. Wherever possible components produced for sub-zero aircraft service were employed, such as: glass-insulated hook-up wire to prevent insulation breakage when leads were flexed; aircraft hydraulic system air compressors, and special solenoid-operated air control and check valves. The battery was thoroughly insulated so that a small thermostatically controlled heater could eliminate serious derating and probable freezing. Lubrication was eliminated both in the pneumatic cylinder and in the butterfly-type air transfer valve with excellent success.

Carrier-current control of pneumatically actuated sectionalizing switches enables substation operator to locate faulted section of transmission line

Smooth control of the air power available was achieved with a simple valve arrangement and electrical relay scheme. The resulting action far surpasses manual operation of the switch. Air is first introduced into the reverse end of the cylinder. This air is trapped and forced to exhaust through a needle valve. Reversal of the air transfer valve charges the forward end of the cylinder but the resulting motion depends upon the easily controlled pressure differential established across the piston.

Manual clearance is obtained by loosening the set screw on the spur gear and sliding the gear to one side. This disengages the mechanism but leaves the detents still in operation. For an additional precaution to back up the detents a chain is locked around the pole and the crank arm.

Operations of the apparatus in final form, after field tests, have been completely successful. Air leaks present no problem, resulting in only approximately 4 minutes of compressor operation per month. During a single storm, line trouble and subsequent testing resulted in 112 operations of the group of switches on this line. Trouble can be localized in the farthest section of the line in eight minutes while manual sectionalizing and isolation by snowshoe or "Sno-Cat" and truck patrol has exceeded 18 hours.

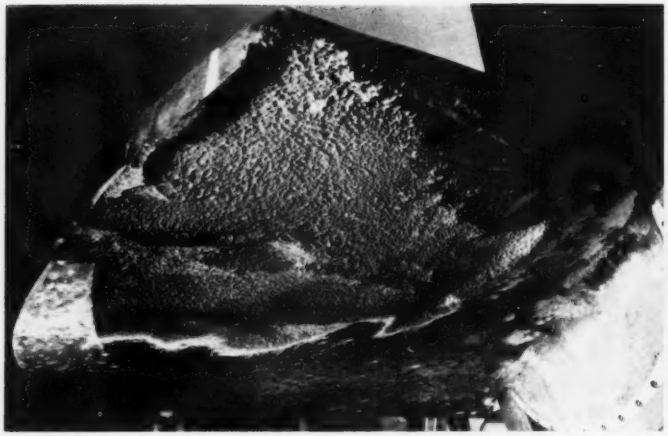


Fig. 1—Typical appearance of pitting caused by cavitation on under side of a cast-steel propeller runner blade after four years' operation. This was repaired by welding with stainless steel which stopped further pitting. Fig. 2 at right—Underside of a propeller turbine runner blade which was prewelded with stainless steel. After two years of operation the stainless steel shows no signs of pitting while the adjacent cast steel is seen to be pitted badly

CAVITATION--CAUSE AND REMEDIES

W. J. Rheingans*

Allis-Chalmers Mfg. Co.

ANY machinery or material coming in contact with high-velocity fluid or vapor is subject to the destructive effects of cavitation. Hydraulic turbines, centrifugal pumps, steam turbines, steam turbine condensers and valves, all of which deal with high-velocity water or water vapor are particularly susceptible to the development of cavitation which produces pitting. (See Fig. 1.) It is therefore important that the mechanics of cavitation and pitting be investigated and analyzed thoroughly in order that intelligent efforts can be made towards the elimination or reduction of the action on materials.

Cavitation is defined as the formation of voids within a body of moving liquid (or around a body moving in liquid) when the particles of liquid fail to adhere to the boundaries of the passageway or the boundaries of the body. Failure of the particles to adhere to the boundaries occurs when there is insufficient internal pressure to overcome inertia of the particles and force them to take sufficiently curved paths along the boundary. The voids thus formed become filled with vapor of the liquid and cause formation of vapor bubbles. Since the inertia of a particle of liquid varies directly as the square of the velocity, and since the greater the inertia the greater the pressure required to force the particle to take a curved path, it is easy to see why cavitation is usually associated with high velocities and low pressures. Pitting as differentiated from cavitation is the erosion of material under the pressures produced by the collapse of the bubbles formed by cavitation.

For many years engineers have been in the habit of using the words "cavitation" and "pitting" interchangeably as referring to both the phenomena of cavitation and the damage it does to material. However, recently there has been a distinct attempt to limit the word "cavitation" to apply only to the phenomena of the formation of voids, cavities or bubbles in a body of moving liquid. The word "pitting" is to be limited to the actual damage to materials by cavitation, this damage being in the form of erosion or wearing away of the material. In other words, "cavitation" is the cause, and "pitting" is the end result.

Mechanics of Cavitation

There has been considerable conjecture in the past on the physical events that take place during cavitation. For many years some engineers believed that pitting was due to chemical action or due to the action of nascent oxygen released from water under high vacuum or due to electrolysis. Much of the lack of exact knowledge of cavitation has been due to the inherent difficulty of observing and recording the details of the phenomenon, since the individual bubbles or voids form and collapse with great rapidity, and cannot be distinguished by ordinary visual observation.

Dr. R. T. Knapp and G. Hollander in the paper "Laboratory Investigations of the Mechanism of Cavitation," A.S.M.E. Transactions, July 1948, described how moving pictures were taken at the rate of 20,000 frames per second of the formation, growth and collapse of cavitation bubbles. These pictures reveal some interesting facts.

* Resume of several recent papers presented by the writer before engineering groups on the West Coast. Author is assistant manager, hydraulic department of the Allis-Chalmers Mfg. Co., Milwaukee, Wis.

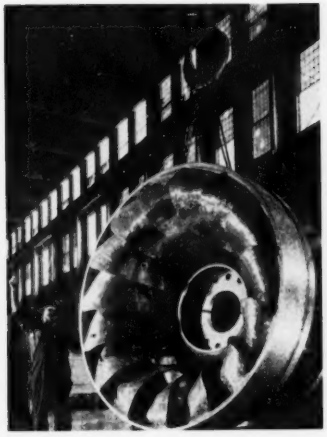


Fig. 3—A 20,000-lb. all stainless-steel cast runner for the Possum Kingdome dam power plant of the Brazos (Texas) River Conservation Commission

Fig. 4—Application of stainless steel strips for prewelding cast-steel runner for Maraetai power plant, New Zealand, decreases cost of stainless steel surfacing

It was found that the bubbles were about 0.3 in. in diameter, that their life was about .003 seconds, and their maximum velocity of collapse was about 765 feet per second, which occurred at the instant of collapse.

From the water hammer formula P-65V, it was calculated that the collapse of each bubble produced a pressure of at least 50,000 psi. This pressure is concentrated upon a microscopically small area, which enables it to attack the individual grains or even the grain boundaries in metal. Since the bubbles form and collapse at the rate of 10,000 to 20,000 per second, it is quite apparent that the destruction of the metal is largely due to fatigue failure. There are very few metals that have a fatigue strength over 50,000 psi. in air and their corrosion fatigue strength is considerably lower. Since cavitation takes place in water, the corrosion fatigue strength of the metal is one of the factors determining its resistance to pitting.

Reducing Cavitation

Since we know that cavitation produces pitting, the big question is how to prevent cavitation or reduce its destructive effects. One of the surest ways is to design our machines to eliminate the combination of high velocity, low pressure and abrupt change of shape of boundary walls, which produce voids and consequent cavitation. However, this is not always possible or economical. The largest field for protection is therefore in the type of material employed, since such properties as tensile strength, yield point, corrosion fatigue strength, brinell hardness, toughness and grain structure of a metal all affect its resistance to pitting.

Tests in accelerated pitting machines have shown a wide variation in the resistance to pitting of various materials. The following table lists some of the more common materials and their relative rate of pitting as determined by such machines.

This table shows that stainless steel has the highest resistance to pitting of any of these metals, which agrees with the results obtained from the use of stainless steel in the field. (See Fig. 2.) The table also shows why cast iron

Relative Resistance to Pitting of Various Materials

Type of Material	Relative Rate of Pitting
Welded Stainless Steel, 17% Cr., 7% Ni	1
Cast Stainless Steel, 12% Cr.	3
Welded Stainless Steel, 18% Cr.	5
Cast Stainless Steel, 18% Cr.	5
HY-Ten-SL Bronze	13
Aluminum Bronze	25
Cast Steel, 0.33% Carbon	37
Manganese Bronze	80
Sprayed Stainless Steel	122
Cast Iron	224–375

is seldom used any more for turbine runners.

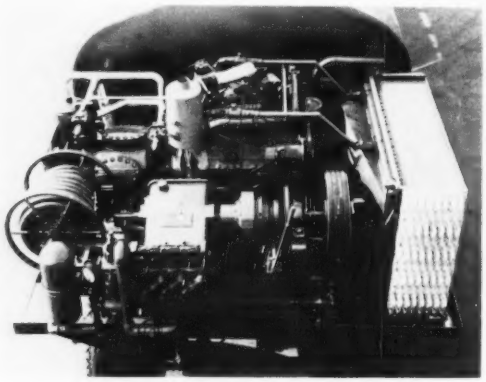
There are several materials such as stellite and some of the hard-rolled aluminum bronzes that have shown a greater resistance to pitting during laboratory tests than any of the stainless steels. However, these materials are generally not very well suited for use in turbine runners or other turbine parts subject to cavitation. One exception is that stellite has been used for impulse wheel needles, with satisfactory results.

A number of all stainless-steel cast runners have been installed in various hydraulic turbines. One of the largest of these, shown in Fig. 3, is a 10-ton stainless-steel runner for the Possum Kingdom power plant of the Brazos River power district in Texas. However complete stainless-steel runners are quite costly, and the usual practice is to furnish carbon-steel runners with welded stainless-steel overlays at the critical points where it is anticipated that pitting will occur. A recent innovation has been to use stainless-steel strips welded to the runner surfaces as shown in Fig. 4. This method not only decreases the cost of surfacing with stainless steel, but insures a more uniform thickness of the overlay and provides a guide for grinding and finishing the runner surface to a true shape.

Although stainless steel has proved to be very satisfactory for eliminating or reducing pitting, there is always the possibility that new metals or alloys will be developed that might prove even more satisfactory. For this reason there are several accelerated pitting machines of the vibratory type in operation in various research laboratories, where specimens of different kinds of materials can be tested to determine their relative resistance to pitting. A test of two hours duration is usually sufficient to determine the merits of any of the specimens.

Very interesting results have been obtained on some of the recently developed alloys, on some of the sprayed metals and on rubber coatings. These tests have not progressed far enough to permit any definite conclusions, and the materials have not been tried out in field installations. However, it is expected that further information will be available in the near future.

INSULATORS TO BE WASHED WITH REFRIGERATED WATER



Power line insulators in Saudi Arabia are to be washed with a unique piece of equipment using distilled, refrigerated water. As here shown, the various units, all mounted on a Fruehauf trailer, consist of a tank of 3,500-gal. capacity, water circulating system, high-pressure system, power section, refrigeration control system, swivel-base aerial ladder, hose, reel and various accessories. Installation was made by Cook & Price Refrigeration of Los Angeles, who specialize in designing unusual equipment.

Use of distilled, refrigerated water was brought about by two important factors entering into hot-line insulator washing with high-pressure water spray. Impurities in water increase conductivity. Evidently the water in Saudi Arabia has a restivity too low to be safely used without distillation. Tests have indicated that current travels along the broken particles of water and not through the solid body of the stream. Water at 60° or less breaks up or fogs less than at higher temperatures. Distilled water enters the tank at a minimum of 105° F and is chilled to 60° or less. This temperature is maintained throughout the hauling period and washing operation by means of the refrigeration and circulation systems that are parts of the equipment.

A number of safety devices were adopted to protect the equipment against damage resulting from extremely abnormal conditions, mechanical failures and operator neglect. Prior to shipment of the equipment from Los Angeles, the personnel who will operate it in Saudi Arabia was schooled thoroughly by test demonstrations.

Sno Cats often are used to carry men and equipment to inaccessible country. U. S. Soil Conservation Service Photos

There'll Be Lots of Water This Year

Paul A. Ewing
Senior Irrigation Economist

R. A. Work
Senior Irrigation Engineer

U. S. Soil Conservation Service

AMPLE water supplies are foreseen for almost all parts of the West during the 1949 runoff season, by the Division of Irrigation and Water Conservation, U. S. Soil Conservation Service,* on the basis of April snow-survey analyses. Deficiencies are expected in only a few sections. Abnormally high peak flows are looked for in others, especially the Northwest, unless favorable weather during the melting season effects a control on the heavy snowpack in the higher mountain elevations. Reservoir storage is expected to be well filled, and soil-moisture conditions are reported as excellent.

In the following paragraphs the prospects are described, state by state, as they were viewed on April 1. The two charts illustrate the situation graphically.

* The Division of Irrigation and Water Conservation is the federal coordinating agency of snow surveys conducted by its staff and many cooperators, including the Forest Service, Bureau of Reclamation, National Park Service, Geological Survey, various departments of the several Western States, irrigation districts, power companies, and others. The California State Division of Water Resources conducts and coordinates snow surveys in that state, while the British Columbia Department of Lands and Forests, Water Rights Branch, has charge of the snow surveys in that province.

Forecast Summary By States

Arizona—The past six years of continuous drought in Arizona came to an end during the past snow season and the outlook for the irrigated areas of the state is very good. As of April 1 the water held in the eight important reservoirs was 30% of capacity, or three times the amount of water stored on April 1, 1948. San Carlos Reservoir, which last year was practically empty, now contains about 25% of capacity.

The extremely heavy storms of January and February, combined with low temperatures, resulted in a record snow pack at the higher elevations throughout the winter. The water content of the snow remaining on the principal watersheds is more than 200% of normal, indicating that, with normal precipitation runoff, the outlook will continue good.

California—The Sierra snow pack is satisfactory. Over-all runoff will average 90% of normal, which should provide a water supply sufficient for all reasonable uses of agriculture and industry. In the Sacramento and San Joaquin valleys there should be enough water to fill all reservoirs except Shasta, with water spilling at the peak of the snow-melt runoff. At the southern end of San Joaquin Valley, which lacks storage, some water probably will reach Tulare Lake Basin. Lake Tahoe is expected to reach the 6,225.9-ft. level, the lowest summer peak since 1937.

Total April 1 storage in 27 reservoirs serving the Sacramento and San Joaquin valleys was 4,796,000 acre-ft., which is 67% of capacity. Excluding Shasta Reservoir, Millerton Lake and three smaller storages, water in the remaining 22 reservoirs is 42% of capacity, which is 69% of their normal April total.

Expected runoff of the principal rivers, in proportions of the recent 10-year averages, is as follows: Sacramento at Shasta Dam, 90%; Feather at Oroville, 92; Yuba at Smartsville, 107; American at Fairoaks, 110;

Mokelumne at Mokelumne Hill 102; Stanislaus at Melone's, 103; Tuolumne at LaGrange, 97; Merced at Exchequer, 87; San Joaquin at Friant, 88; Kings at Piedra, 89; Kaweah at Three Rivers, 65; Kern at Bakersfield, 58.

Colorado—Except for the Arkansas and Upper South Platte, snow cover on the mountain watersheds of Colorado was well above normal on April 1. Unusually heavy snow exists on the headwaters of the North Platte, Yampa, White, San Juan, Dolores and Rio Grande. The 1949 summer flow should equal or exceed any of the past ten years. In the South Platte drainage 125% of normal flow is expected in the Poudre, Big Thompson and Saint Vrain tributaries and normal to slightly below in Boulder Creek, Clear Creek and Upper South Platte River. The flow of the North Platte should be very high with peak flows around 12,000 ft. at the gaging station at Saratoga, Wyoming. Unless April snow accumulation is above normal, the total and peak flows of Rio Grande and its main tributaries in Colorado should about equal those of 1941.

The summer flow of the Arkansas is expected to be slightly less than normal and about 70% of each of the past two years. Seasonal precipitation over the state has been about average. Western Colorado has received somewhat more than normal. On the eastern slope precipitation has ranged from slightly below normal for the South Platte to very light in the Arkansas Valley.

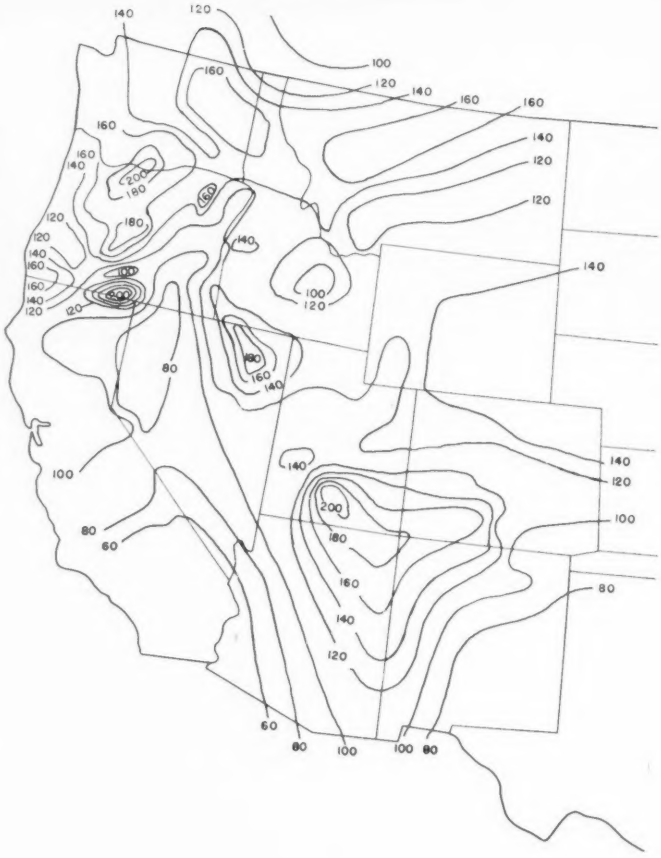
Idaho—Snow cover throughout the Columbia River Basin was high during the entire winter. Snow surveys on April 1 showed a water content generally ranging well above normal. In the basin as a whole the snow cover is heavier this year than for any previous year of record.

Stream flow during March was below normal for most of the basin. Any snow that may have melted presumably was held in the watershed soil mantle. However, extremely heavy runoff will occur down the main stem of the Columbia River during the next six months, and damaging peaks will occur, provided the various tributaries peak more or less simultaneously. Under normal weather and runoff conditions the southern tributaries peak and pass down the Columbia before the northern streams rise. Abnormally cool weather over the southern part of the basin during April, with normal or above-normal precipitation, would greatly increase the prospects of high-water damage.

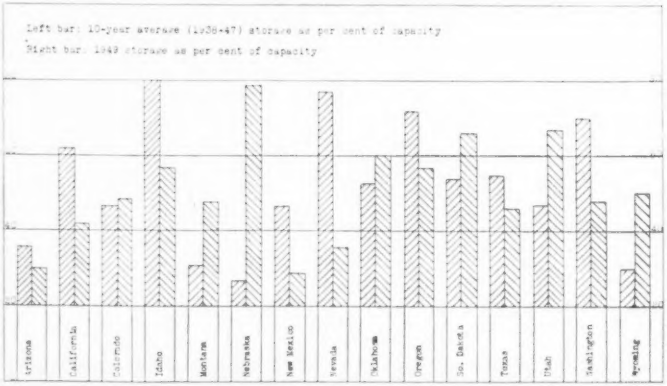
Valley precipitation accumulated since last October is now normal to slightly less than normal in Columbia Basin. Precipitation was slightly less

Prospective April - September Stream Flow

Figures are per cent of 1938-47 average



Storage Situation in Western Reservors



than normal during March. Reservoir storage in Idaho was below normal for April 1, but reservoirs will be filled readily when the spring runoff begins.

Montana—Snow surveys throughout the Upper Missouri Basin promise excellent irrigation supplies for the tributaries of Missouri River above Fort Benton. Water content is approximately 40% above the 12-year average. Valley precipitation was generally below normal during the winter months. Jefferson River and its western tributaries are likely to produce extremely high peak flows. In the upper Columbia River basin the snow pack ranges from 125% of normal in Canada and 150% of normal on the Flathead to 160% of normal on the upper Clarks Fork. The threat of extremely high peak flows lies in the unusually high percentage of water content at low-elevation courses. High courses show more water content than in 1948 and the low courses double the threat of damaging peak flows, especially in the event of warm weather accompanied by rains.

Nevada—Irrigation water supplies will range from fair in western Nevada to excellent in the eastern portions of the state. Snow-water runoff of eastern Sierra streams will vary from 70 to 100% of normal, while Humboldt Basin streams will flow from 100 to 200%. Groundwater levels continue low and submormal temperatures have retarded early-season streamflow. Reservoir storage is low with total storage on April 1 about 80% of last year, 45% of the 1938-47 average, and 35% of the usable capacity. However, under normal weather conditions during the summer all reservoirs except Tahoe should fill. Lake Mead holds about 95% of last year's April 1 storage.

New Mexico—In northern New Mexico between the Rio Grande and the Continental Divide the snow accumulation is very heavy. East of the Rio Grande and on the Canadian River tributaries, the snow cover is normal to slightly below. Soil-moisture conditions are reported good throughout the irrigated areas of the state. Storage in Elephant Butte Reservoir is rather low but should increase substantially. El Vado Reservoir on the Chama has been drained in anticipation of high inflow during the 1949 season.

Oregon—The 1949 water supply outlook is good throughout the state, deficiencies not being expected anywhere, provided snow-melt and runoff conditions are normal. In fact, unusually high flows are likely to be recorded on most streams, especially the Walla Walla, Crooked, Upper Deschutes, White, Clackamas, North and South Santiam, Sandy, Applegate, Hood, and Umatilla rivers. Watershed soils are believed to be wetter than usual, a condition favoring increased runoff from the snow pack. Soil moisture in valley soils is also reported as favorable, although recent drying winds have caused a demand for irrigation in some places. Reservoir supplies are rated as generally good to excellent. While total storage in all reservoirs is only slightly more than at this period in 1948, 17% less than in 1947, and 20% less than the 10-year average, further substantial inflows are expected. Many small reservoirs are already full.

Snow surveyors examining their equipment before starting on measurements of snow depth and density. Their findings plus surveys by the individual utilities enable power companies to forecast runoff and seasonal power supply

Santa Claus chimney provides access to buried cabin used by snow survey crews. Doors are provided at different heights to avoid unnecessary climbing

Utah—At the opening of the snow-accumulation period the watershed soils were very dry, but an abnormally high accumulation of snow and water was finally attained. While the dry soil cover has the effect of lessening somewhat the threat of excessively high water, there is still danger that considerable damage may result from peak flows of various streams. All watersheds will yield nearly 120% of average water supplies, with the East Fork of the Sevier expected to yield at least 200% of its average.

All reservoirs are expected to fill even though the smaller ones have been drawn down to provide flood protection. The reservoirs as a whole show storage totaling 67% of capacity.

Washington—Washington shares the generally favorable outlook of other Columbia Basin states, the heavy snow pack in the Cascades having been increased during March. While storage was lower than normal on April 1, the reservoirs are expected to be filled rapidly by spring runoff.

Wyoming—Snow cover is well above normal and is especially heavy on the North Platte watershed. Although fall rains and winter snow brought the total precipitation just above average, soil moisture conditions are good throughout the state. Summer flow of all Bighorn River tributaries should be well above normal. There is a slight deficiency of snow cover on Powder River tributaries. Reservoir storage is about 25% less than last year's total.

British Columbia—Water supply prospects for southern British Columbia are very good. The Coastal, Lower Fraser, Skagit, Similkameen, and Okanogan areas should have high runoff with possibilities of flooding unless cool weather ends and more melting begins very soon.

The main Columbia and West Kootenai are expected to have more than normal runoff, while the East Kootenai and Upper Columbia should experience a runoff with proportions less than a 10-year normal. The latter is based, to some extent, on less than normal soil moistures on the western slope of the Rocky Mountains and in the Lardeau and Duncan River basins.

Snow water-content is more than normal throughout the entire southern part of the province. General flooding is not expected, although local floods probably will result from the reduced capacity of channels brought about by the flood of last year. Okanogan Lake, a difficult reservoir to regulate, probably will experience high water again, with attendant flooding.

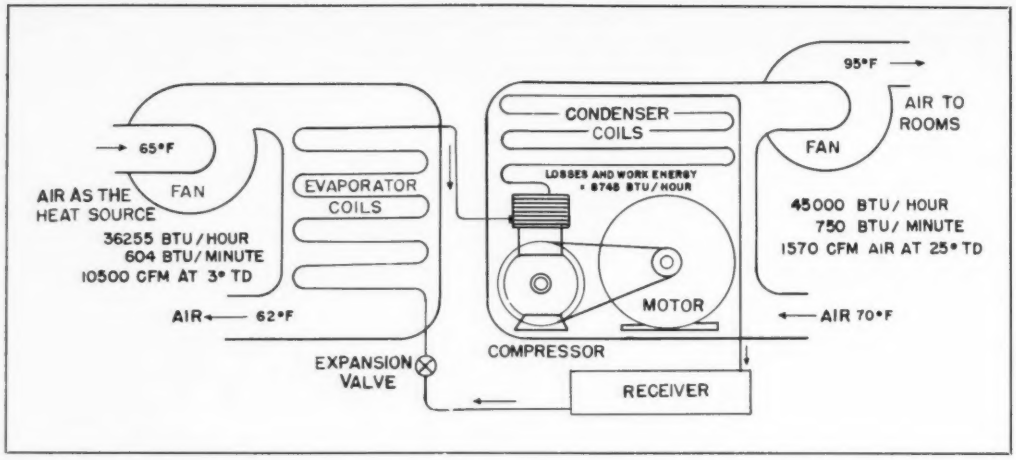


Fig. 1—Schematic plan of heat pump for extracting heat from the outside air and delivering that heat to the air system of a home. Typical problem is worked out and figures are given for the various heat components which are combined into the total output of the plant. Heat pump may derive heat from the air, from water or earth

HEAT PUMP DESIGN PROBLEMS

Homer J. Dana*

Washington State College, Pullman

THE domestic heat pump appeals to many people as a new gadget which they desire to acquire to satisfy their pride of possession. Others are intrigued by the promise of high economy and of clean heat. Some even optimistically look upon the heat pump as the answer to all of the present heating plant ills.

It is true that, where conditions are favorable, a heat pump will give satisfaction, but unfortunately not all residences possess such favorable conditions. Although the principle of the heat pump has been known and discussed for many years, only a relatively small number have been installed in residences throughout the United States. Not all of these have proved successful. The result is that there is relatively little experience data available to serve as a guide for the conservative design of new installations. Furthermore, basic engineering design data have not been standardized for this type of application and therefore are not yet available to the designer. Consequently, each new heat pump installation in a community assumes the role of an experimental venture. If it costs more than was planned, or delivers less heat than is required, there often results a community-wide condemnation of the heat pump idea in general. Usually such failure is due either to lack of recognition of the limiting conditions which prevail, or to engineering based on inadequate data or experience.

As a contribution toward the better understanding of the domestic heat pump, the State College of Washington has prepared a report in which typical design problems are presented to illustrate the use of air, water, or earth as the heat source. Also included are suggested design data charts based upon operating data for various sizes of commercially available condensing units.

The Heat Pump

A heat pump is nothing more nor less than a mechanical refrigerator which cools one object by extracting heat from it and delivers this heat to another object to raise its temperature. The object cooled, usually called the heat source, may be a quantity of water, a volume of air, or a portion of the earth's crust. The object to which this heat is to be added, in the case of the domestic heat pump, will be the house and its various rooms. This is called the heat load.

Components of the heat pump include the motor, the compressor, the evaporator, or cooling coils, the condenser coils, the refrigerant receiver or storage tank, the expansion valve, and the various operating controls. Fig. 1 shows the components of a typical heat pump using air as a heat source, and delivering heat to another air system to heat a house. This is only one of the 15 illustrations included in the report.

Efficiency of the Heat Pump

The efficiency of the domestic heat pump, usually called the coefficient of performance (COP), under favorable practical conditions may reach as high as 3.0 to 4.5. This means that if 3 kwh. of energy are used to operate the heat pump, as much as 9 to 13.5

* Director of Engineering Experimental Station, Washington State Institute of Technology, State College of Washington, Pullman, Wash. Abstract of paper presented before the Northwest Electric Light & Power Assn., Boise, Idaho, April 8, and the Associated Engineers, Spokane, Washington, March 30, 1949.

kwh. of equivalent heat energy will be delivered to the rooms of the house. However, if an additional motor is required to pump water from a well as a source of heat for the heat pump, then to arrive at the over-all efficiency of the plant the energy supplied for pumping water must also be added to the energy supplied to operate the heat pump. Thus, any required auxiliary power serves to reduce the so-called over-all efficiency, or COP of the plant. The performance of a heat pump is expressed by the formula:

$$\text{COP} = \frac{\text{Total Heat Output}}{\text{Equivalent Heat Input}}$$

Under favorable conditions the over-all COP of the plant may reduce to the point where the output is no greater than the input. In such a case the electrical energy used to run the plant could just as well be used in space heaters in the rooms of the house. Under such conditions of operation, it is obvious that no advantage is gained by investing in a heat pump at all.

Several different examples of heat pump design are presented and worked out mathematically to illustrate the various components of heat which may comprise the total output of a given installation. These components include the heat derived from the heat source, the heat losses from the motor and from the compressor, and the work energy contributed by the motor in compressing the refrigerant gases. In some installations only part of these heat components are delivered to the rooms, and thus the highest COP is not realized.

An example is given also of a proposed heat pump installation using a diesel engine as motive power. In this case part of the heat losses are recovered from the cooling jacket and from the exhaust gases of the engine, thus improving the COP of the plant.

Data are provided for the computation of heat flow to refrigerated pipes buried in the earth. These were obtained partly from various published sources, and partly from experiments being conducted at the State College of Washington. Such information is very helpful where earth coils are to be designed for extracting heat.

In the selection of a condensing unit best suited to the conditions applying to a given installation, it is helpful if the characteristics of various sizes of units can be charted for easy reference. In Fig. 11 is shown a suggested design chart for a 3-hp. commercially available condensing unit. Charts are also included for three other sizes.

The complete report will be available for free distribution early in May 1949, and will be designated *The Domestic Heat Pump* Bulletin No. 73, by the Engineering Experiment Station, State College of Washington, Pullman.

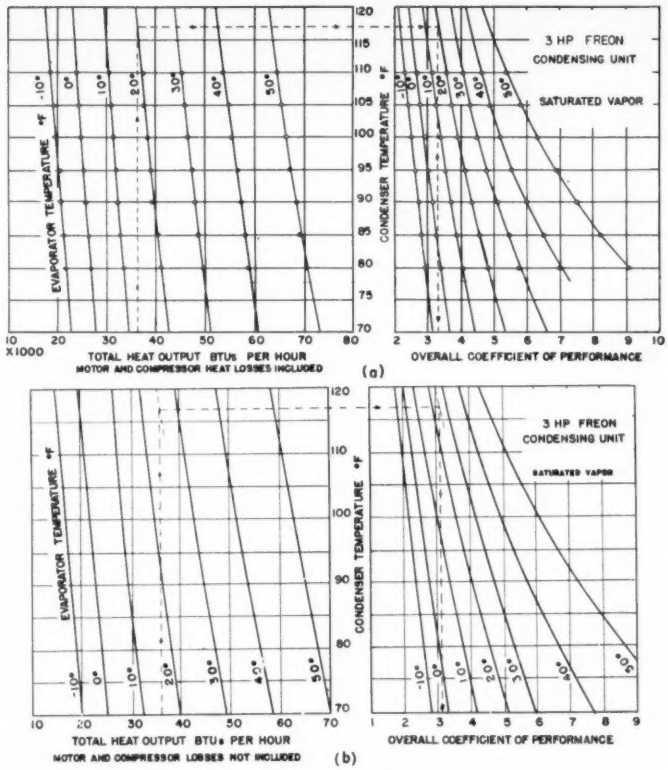


Fig. 2—Suggested chart for a 3-hp. condensing unit showing performance characteristics under different working conditions of suction and discharge temperature. Use of such curves for different-sized units enables the designer to select quickly and easily size of unit required and determine its coefficient of performance. Such charts save a large amount of time and painstaking calculations

MOBILE RADIO OPERATING COSTS

For every hour the dispatcher talks over its main radio transmitter, Puget Sound Power & Light Co. finds that the same number of man-hours must be expended for maintenance of 40 mobile units, according to A. A. Noon, of that company. "In other words, with 250 hours talking to the cars, we find that 250 hours maintenance is required for the cars. This 500 hours is about one year. Thus at $2 per hour we have $1,000 per year or $25 per car per year, or $2 per month. First cost of equipment is $500 per car or $50 per year per car on a ten-year basis. With maintenance cost about $25 per annum, total yearly cost is $75 per car or about $6.25 per month.

"New carrier telephone service to stations runs about $4,400 per station, less line traps, or $8,800 for two stations as against the figure of $2,000 per station for radio, or $4,000 for two stations—no traps—no line coupling. Maintenance of radio is about equivalent to carrier on a year's basis. Thus we have a 50% saving per station on radio without line traps. Usually line traps will run about $500 per line, with by-pass coupling per switch conservatively estimated at $2,500."

Speaking before a group of utility engineers, Noon said, "We must get behind the Northwest Radio Utility association with a delegate to help to get the whole radio program satisfactorily straightened out."

BRIEFS OF IES CONFERENCES

USABLE and valuable knowledge about lighting was given those who attended the regional conferences of the Illuminating Engineering Society at San Francisco and Portland in March. To bring, in digest form, these talks or papers to the entire industry, we are indebted to Walter Potter and Berkeley Snow for those presented at Portland which were not given at San Francisco. Where indicated complete copies of the papers may be obtained from IES or its publication, *Illuminating Engineering*.

President Lee E. Tayler

After reviewing for new members the purposes, functions and scope of the Illuminating Engineering Society, President Tayler spoke of its new venture into publishing with the enlargement of *Illuminating Engineering* to magazine size and solicitation of advertising, appointing a staff and consequent increase in costs. To continue such service he suggested the society may have to increase dues. Tayler also listed other publications such as standards, program materials, data sheets and the handbook, which is to be revised for a new edition in 1951.

President Tayler concluded by discussing the professional status of IES as an engineering society. Laws in 44 states require registration of professional engineers and it is necessary to raise standards of full members to establish beyond question the professional status of such members if they are to qualify as recognized engineers. The society may have to come to examinations of necessity. The English society does so now.

New Light Sources

At both conferences new light sources, both incandescent and fluorescent, were shown to those attending. At San Francisco and Portland Charles Long, Westinghouse Lamp Division, Los Angeles, gave a novel twist to the showing and demonstrating of the incandescent sources of all makers. At San Francisco J. W. Howard, General Electric Lamp Department, Los Angeles, and at Portland, Don Caverly, Sylvania Electric Products, Salem, Mass., presented the new fluorescent sources.

Disguised as a correspondence school detective, Charlie Long declared he had been put on a case by Mr. Pound Foolish to find out why Mr. Penney Wise was so successful in his business operations and factory production. What he had sleuthed and found out was that Penny Wise was making use of many new lighting tools as secret weapons for success. In this way Long showed the new lamps, one by one. Included were many new applications of sealed-beam integral-reflector lamps, ceramic enameled colored bulbs, smaller sized reflector spots and floods, new silica coated inside-frost lamps, diffusing-bowl lamps, new sports-lighting high-lumen-output shorter-life lamps, photofloods for television with high Kelvin temperature output.

Howard and Caverly, respectively, reviewed work in electric discharge lamps, new mercury lamps, high arc sources for studio spots, cadmium added to mercury to add a red line to balance the light, new krypton lamps that bring higher efficiency from the same wattage and hence use existing ballasts and sockets. There were instant germicidal lamps in slimline types for operation in air conditioning ducts, 1-watt fluorescent night lights, warm whites in fluorescent lamps, a photocolor fluorescent lamp for viewing transparencies, fluorescent sun lamps, more slimline lamps operable at higher ma. ratings. Howard also spoke of the possibilities of even higher efficiencies if lamps can be operated from 540-cycle frequencies. Strobe is minimized, ballasts can be reduced from pounds to ounces.

Light and Architectural Design

So different in its approach and its usability was the presentation of this subject by Victor Gruen, Gruen & Krummeck, architect and store designer, Los Angeles, that it will be presented in full and illustrated in a later issue.

Applied Brightness Engineering

The paper by W. D. Darley, formerly of G-E Lamp Department, Los Angeles, now consulting engineer in Austin, Texas, was presented at San Francisco by Foster Sampson, consulting engineer, Los Angeles. In it Darley tells of the difficulty experienced in finding office lighting fixtures with which to light an office without violating the principles of brightness ratios for eye comfort. Most fixtures, he contended, have too great a side brightness. Likewise he said that there seemed to be a lack of agreement among men in the industry as to what was right. He concluded by asking that the recommended office lighting standards be rephrased to read that "the surroundings or any substantial area in the visual field should not be brighter than nor less than one third as bright as the task." (The paper is published in a recent *Illuminating Engineering*.)

Color Technology of F Lamps

G. B. Buck II, General Electric Lamp Department, Cleveland, with a series of light boxes, each lamped with a different "white" lamp, either incandescent or one of the five "whites" now on the market, differentiated between the abstract physical concepts of wave length or quantum theory and the physiological and psychological sensations of seeing. He then traced the physicist's search for ideal white light sources, the experiments with fluorescent powders to obtain first the "daylight," then "soft white" then 3,500° and 4,500° K whites. Curves were shown to compare these various sources to the incandescent lamp. An interesting thing, said Buck, is that from a human satisfaction standpoint as well as theoretically, a better job is done with a combination of the two, fluorescent and incandescent.

Speaking of the characteristics of materials and their effect on color he reminded that white paper is not 100% white. Black photo wrapping paper, he said, is nearer perfect black than white is white. Eye remembrance or association of color also affects the sensation of color felt by each individual.

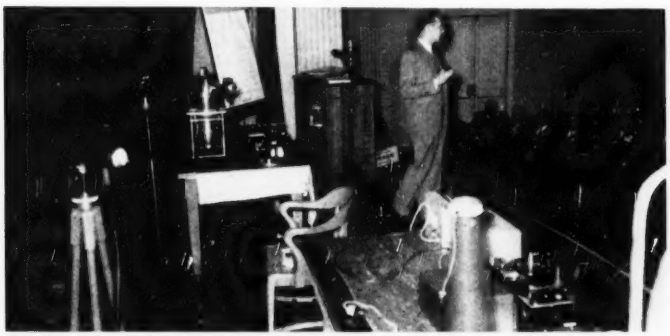
A standard color rating chart is the ICI diagram and work has been done to relate mixtures of colored lamps to attain certain color temperature ratings. From these it is possible to develop decoration and lighting with response to the colors used and still attain a definite light whitene s.

Buck then told of interesting further experimentation to determine the color ratings of human complexions. This covered blondes, brunettes and redheads; caucasians, asiatics and negroids; and considered the pigmentation of the skin, the color of blood hemoglobin, the amount of carotin and other basic factors. Hip, face and upper arm were rated. From these studies he

showed charts of color variation and also the change due to time of year and sun tanning. These studies showed that under the skin all races are basically the same in blood and tissue. The skin of one contains more melanoid than another, only. A weighted average of Americans as a whole and of the three racial colorings was reached. From this it is hoped more intelligent use of color in lighting can be engineered to make complexions look well.

Similar studies are now being made on foods, such as coffee with cream, salad vegetables, etc. And color preference tests are made with a large number of viewers. Nature, he observed, has conspired against the lamp maker for most things in nature absorb more of the blue and reflect more of the red in white light. Being engineers, he smiled as he said, all this checking the smoke emitted by large trucks. The device has a telescope-like tube which limits the field of view to a 1° angle. A police officer takes two readings, one at the sky, the other the plume of smoke from the diesel truck. Finch said it would be a simple matter to adapt this smoke density meter to a brightness meter, one not dependent upon human judgment.

He also showed the Baumgartner reflectometer for instrumental measurement of reflection of various surfaces and materials; and the Taylor low-level-brightness meter used to measure sky glow during wartime. Some modern instruments he showed were an ultraviolet reflectometer for testing reflection of germicidal rays from various paints and surfaces. Another measures irradiation for use in exploring an area to determine zones of radiation. In the opposite end of the spectrum, Finch spoke of the need for but the difficulties in obtaining a portable radiometer for infrared radiation. Recently such a portable meter has been developed in conjunction with navy research for infrared "seeing in the dark" with the "snooperscope." Essentially it is a thermal pile which picks up radiations reaching it and converts the energy into an electrical current that can be amplified. Further development of this type of instrument, said Finch, would be useful in connection with designing and controlling panel radiant heating systems.



Some of the new light measuring instruments demonstrated and explained by Professor Dan Finch of the University of California, at first day's session

was done before people were asked what they liked. But he predicted that, from all this work, light sources can and will be selected to fit better any given materials or environments.

Lighting Measurement Instruments

Professor Dan M. Finch, University of California, Berkeley, had a stage full of instruments to describe and demonstrate. Among new developments he first spoke of footcandle meters with cosine corrected cells and with filters for color correction; then of larger laboratory instruments with hemispherical dome and built-in color correction filter. Cells themselves have improved sensitivity because of laminated lens plate, making them more satisfactory in street lighting measurements. For brightness measuring the old Luckiesh-Taylor meter is useful but subject to error. Finch showed a device developed by the university for mounting in highway police cars for

Pros and Cons of Lighting Systems

Don Caverly, Sylvania Electric Products, Salem, Mass., combined two or three IES papers in a general discussion of the pros and cons of light sources, lighting systems and color. Interesting thing about his comments was that he spoke tolerantly of some of the things designers do which cause most orthodox lighting engineers to mutter. Such decorative treatments as dark ceilings and walls in order to obtain a certain color harmony or decorative purpose have their place. By them drama, or depth, or contrast is achieved, whether these practices conform to the recommended standards for store lighting or not. By pictures he showed many such inventive uses of form and color in modern store interiors and exteriors, each done with conscious reason.

After these preliminaries Caverly briefed a publication titled, *Color is How You Light It*, which resulted from his company's study into the relation of light sources to color. An artist was put on the pay roll, said Caverly, to reach that point of view. In explaining the booklet, which is printed in color and is available from Sylvania, Caverly explained that, in trying to describe color and reaction to it, language is lacking for accurate description, for one tries to describe visual *sensation* rather than absolute quantities. Words from other sensory categories have to be used as analogous.

The studies he described resulted from personal choice preference tests of light sources for seeing and appreciating several families of colors. Charts in the booklet group these as the red family, the pinks and tans, the yellow family, the green family and the blue family. Each group bears a caption such as: "the following colors look best under warmtone lamps, second best under incandescent lamps." Beside the color sample of each tone or hue is a name often used to describe the color. Then under each of these lamps—incandescent, warmtone, 3,500°, soft white, 4,500° and daylight—what that color of "white" does to the color, such as whether it appears clear, bright, has a yellow or grey cast or is deadened.

From such data, Caverly said, the designer, artist, or engineer could predict the effect that use of certain light sources would have on colors in any combination and hence could plan to use that effect consciously or to avoid unwanted results. By mixtures of light sources balances could be achieved. Thus what the customer *wanted* of light could be prescribed.

Economics of Store Lighting

Another paper dealing with the mixing of fluorescent and incandescent light for merchandise appraisal was read by George Rankin, Southern California Edison Co., Los Angeles, for Kenneth Welch, Grand Rapids Store Equipment Co., Grand Rapids. The paper begins with standards for evaluating space productivity for a business

in terms of sales per net square foot of area per year, quality and quantity of light, and quality in relation to cost of operation. Figures are given for small and large stores in three income producing groups. From these standards the paper proceeds to developing standards of lighting to achieve satisfactory quality and sufficient quantity on the merchandise with lower values for the environment. Such data should be valuable in determining investment in lighting for stores of various sizes and in urban or suburban locations. The paper was presented at the IES convention last September and will be printed in *Illuminating Engineering* in full.

Interesting was the testing of lighting quality on different kinds of merchandise in a variety of surroundings with straight 6,000° K blue white diffused illumination, with incandescent alone and with combinations of the two. Colored slides gave a visual proof of the differences in appeal.

IES Recommended Practice for Stores

Oscar Meissner, Department of Water & Power, Los Angeles, summed up the value of the IES recommended practices for store lighting as a guide for the illuminating consultant for utilities, for the designer, architect, engineer and contractor in preparing plans for store lighting. He said he had found it easy to use and welcomed by architects, and recommended strongly that it be placed in the hands of all who should have it.

Louverall Design

Wentworth Potter's paper from the IES national conference was briefed by Gaylord Buck II of the same company, at both regional meetings. It reviewed the virtues as well as drawbacks of louverall ceilings. The good features are that it offers a unique means of preventing direct light from the source from reaching the eye; the louverall offers a designer a functional ceiling; there is flexibility for adding more units at a later time; maintenance is low; the louvers also conceal piping, sprinkler heads, air ducts, etc. Its disadvantages come from reflections on shiny surfaces and reflected glare. This can be overcome by tilting louvers and use of low-brightness sources, such as slimline lamps operated at low ma. Another disadvantage is cost, unless part of it can be charged to building cost in lieu of a furred ceiling.

Buck then went into the technical aspects of louver design to get angles of reflection, grid sizes, patterns and appearance of satisfactory character.

Gaylord Buck II of Nela Park, showed some examples of louverall systems.

Efficiencies of the cavity above the louverall, reflectances, louver sizes and shapes, position of lamps in respect to the louvers, coefficients of utilization, brightness and such other values are given in the paper.

Thirty Streets in One

T. W. Fitch, illumination engineer, Portland General Electric Co., demonstrated the street lighting laboratory maintained by that company in which the several kinds of street lighting actually can be demonstrated on the ground. This story already has been told in ELECTRICAL WEST and may be reviewed from that issue.

Optometrists Viewpoint

"Do not force the eyes to solve insoluble problems, either in brightness or color." Dr. A. E. Kidd, secretary of the B. C. Optometrists Assn. and secretary of the B. C. Board of Examiners, Vancouver, speaking at Portland on "The Optometrist's Viewpoint on Lighting," declared as he described the mechanism of the eye and the process of seeing and showed how the task of seeing had changed with advancing civilization.

"The lighting engineer should be concerned primarily with providing sufficient light to see the details of the task in hand, distributed in such a way that no excessive demand is made on the light-adapting mechanisms. The emphasis should, of course, be placed on distribution. The absolute intensity is of minor importance. It makes little difference how high or how low it is, provided it is sufficient for the individual concerned to discriminate the details of the task in which he is engaged and that the illumination of the field in which he is working is relatively uniform.

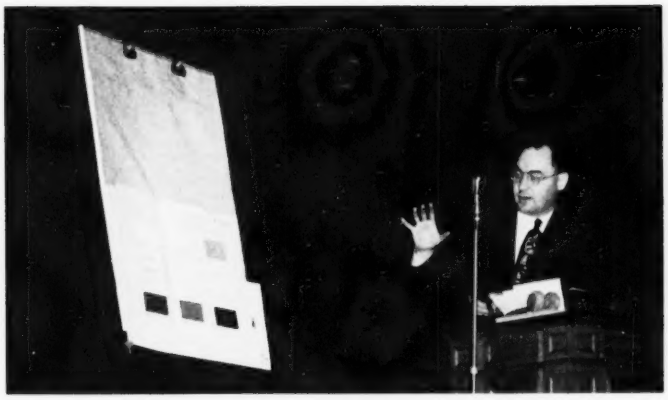
"Recommended levels of illumination, as determined by the footcandle selection test are not valid in practice. Based, as they are, upon the one relatively unimportant factor of increased visual acuity with increased illumination, and with no consideration given to comfort or efficiency, the indicated intensities are much higher than the subject would select for the working conditions of his home or office. It is true that visual acuity can be brought momentarily to almost any desired degree by sufficient intensity of light, but substituting light for lenses would simply aggravate the existing visual problem.

"As I have pointed out, visual acuity is not the most important factor in optometry; our problem is to provide efficient co-ordination between the dual functions of the visual system.

"With regard to the distribution of light; if a part of the visual field is brightly lighted while another part is in comparative darkness, how is the iris to respond? One stimulus demands that it contract, the other that it dilate. It cannot respond to both and therefore a disturbance is set up in the central nervous system and the familiar signs of fatigue appear. This is why large differences in the illumination of different parts of the retina should be kept to a minimum. For instance, a white page of paper on a dark desk top, no matter how high the level of illumination, presents a situation to the light-adapting mechanism which cannot be reconciled and, as in any other case of unresolved conflict, faigue and discomfort develop and visual achievement is lowered.

"Tolerable brightness contrast varies with the individual powers of adaptation, but a 1-10 ratio in adjacent areas of the retina is probably a minimum brightness difference necessary to produce a comfortable working environment. It should be kept in mind that phenomenal brightness differences are very much less than those indicated by a brightness meter.

"Color contrast is another matter that should receive the attention of the lighting specialist. For example, blue letters on a red background produce a feeling of irritation. Red rays, of longer wave length, focus at a greater distance than the blue, so that when the retina is exposed to such a situation, it is confronted with another insoluble problem. The red background demands that the focus be fixed at its apparent distance, while the blue figure, from which the mind is seeking meaning, demands that it be focused there. The result is a conflict that cannot be resolved and the mind aban-



Don Caverly of Sylvania explains the color preference tests with lighting of various "whites" available in both fluorescent and incandescent sources

dons the attempt to obtain meaning from it.

"In summary, may I again emphasize that the optometrist is concerned principally with reducing or abolishing the stresses set up in the dual effector systems of accommodation and convergence, while the lighting specialist has an equally important responsibility in providing illumination which reduces to a minimum the demands on the light-adapting mechanisms of the eye. It is the lighting specialist and the optometrist who have made it possible for mankind to move indoors, to adapt himself to a near point environment and thus make possible the educational, scientific and cultural advances of our modern civilization."

Modern Store Lighting Trends

Modern trends in store lighting were discussed at Portland by A. L. Hurley, Canadian General Electric Co., Vancouver, who stated that "atmosphere" in the design of store interiors is now being obtained by light instead of by wall decoration. He described the "Three A's of Store Lighting" attraction, appraisal and atmosphere in the following paragraphs.

"Attraction lighting is lighting on the merchandise for the express purpose of drawing attention. The degree of attraction involves not only the footcandles on, or, if you like, the brightness of, the article, but also depends on the elements of display—contrast, silhouette and color. Therefore, in the modern store, non-selling areas are made less attractive and merchandise areas are made more attractive by studied use of these four factors: footcandles, contrast, silhouette and color. Illumination values accordingly can vary from tens to hundreds of footcandles in the same store.

"Appraisal lighting is lighting on the merchandise for the purpose of evaluating the qualities such as color, texture, form and workmanship. This is the closest that lighting comes to being standardized for different stores, for there are many items, for example diamonds and automobiles, which require specific lighting techniques and very often the solutions for appraisal lighting are quite similar.

"Atmosphere lighting is lighting used anywhere to achieve psychological impression. Architecture, materials, and color all contribute to the general effect on the customer. However, each of these factors needs to be integrated by light to create a distinctive and favorable store appearance. It is this quality of lighting that contributes so much in setting the store of today so well apart from its predecessors."

Troffer Lighting, Coulee School

David E. Moses, lighting specialist of General Electric Supply, Spokane, prepared a paper in collaboration with T. R. Anderson, engineer in charge of lighting power and heating at Coulee Dam. The paper is now being submitted to the National Technical Council as a possibility for the program of the next annual meeting of the Illuminating Engineering Society.

Moses showed pictures at Portland of the suspended troffer lighting in the two schools, the old Columbia School and the new Central School at Grand Coulee. It was desired to approach 100 f-c of lighting in this job, and the pictures indicated this level. Methods of mounting the units, together with construction and details, were presented.

Lighting New and Remodeled Schools

Beverly Travis, consulting engineer of Seattle, Wash., past president of Illuminating Engineering Society, Washington State Engineering Council, discussed the modernization and relighting of the city of Tacoma grade and high schools at Portland conference. Travis showed charts of how the various fixtures were evaluated before the final decision was made. He showed pictures of the old installations having low levels of illumination, and explained how they were modernized with fluorescent lighting. His paper will appear in one of the Illuminating Engineering Society or other technical publications within a few months.

The project was started two years ago. Travis submitted to various fixture manufacturers full specifications, distribution curves, co-efficient of utilization with efficiencies of at least 75%. Many manufacturers submitted samples of their units with complete engineering data including Electrical Testing Laboratory tests and distribution curves. The fixtures were graded in accordance with appearance, maintenance, efficiency and cost.

After the fixtures were evaluated by an independent committee, each manufacturer submitted complete fixtures, 21 for the average classroom. This gave each manufacturer an opportunity to show a complete room installation, at which time the school board decided which type of fixture to purchase. All fixtures were purchased through the electrical supply jobbers in the city of Tacoma. Seven manufacturers submitted their equipment and it is now being installed. Approximately one-third of a million dollars will be expended when the fluorescent lighting job is completed.

Light for the Growing Child

The human organism, its strains and stresses, its behavior under them, is functioning—that is the interest he as an educator and school executive has. Lighting is one of the factors of the *total environment* that must be related to the human being, especially the growing child. So said Dr. Darrell B. Harmon, whose work has turned the Illuminating Engineering Society, of which he is outspoken member, from traditional pathways toward this basic idea of making the lighting serve the human being in ways that fit his nature.

Dr. Harmon said his approach was different from that of the scientists in illumination whose work has been directed toward visual clarity for detail recognition. His has been toward achieving a physical and psychological balance in which the visual center per-

formance is related to life. There are three functions of vision, he said; accommodation, convergence and associated body balance, all of them having elements of time and sequence, depending on the task. For momentary seeing, such as inspection, looking around, brief reading, shopping, the work of the past on visual clarity applies.

But for the sustained task, such as classroom work, drafting, accounting and the like, body balance comes first, then convergence and accommodation. Accommodation follows, not proceeds body balance. The central field recognition lighting in sustained work is successful only if it conforms to other body balances. The peripheral area is more important than central vision. Central vision areas do not lead to the same centers of the brain as do the peripheral seeing areas of the eye, which are used in body balancing.

In the school field, said Harmon, they are not interested primarily in *what* a person sees but what he does about it, what actions are aroused, whether they are constructive or destructive acts. Therefore the primary function is to establish balances for the energies of the child in its environment in relation to sounds, light, heat, gravity, etc.

Society has decided that certain marks on paper have meaning and often this communication of thoughts is overemphasized. More attention is needed toward the action induced in people by all of the factors surrounding them.

Dr. Harmon then explained that reflex mechanisms in the human body tend to center the person toward the brightest area in his surroundings. Similar adjusting is done toward sound when it comes predominantly from one direction. The body also seeks adjustment to gravity, to its stance, or seating posture. If the body has difficulty in adjusting these various demands upon it, tension results. Under tension the human tends to avoid and repel the situation and hence the intake of knowledge under stresses of this kind. Therefore lighting in footcandles has little meaning. A balanced lighting for both recognition seeing and for peripheral field body equilibrium is what is needed.

Another interesting physiological and psychological factor Dr. Harmon touched upon and illustrated by pictures was that a child grows along a line of stress to reduce the stress upon him. This shifts his body, in relation to lighting, and alters the structure of his body. The things that take a person out of tolerance are lighting contrasts, poorly designed furniture to sit in and work, inadequate illumination,

Dr. D. B. Harmon illustrates the posture desk he designed for schools at which students can adjust the top to receive light at the correct angle.

unwise choice of color temperature lamps, poor distribution of light. Unwise color surroundings also tend to disturb balance since different colors focus in the eye at different distances.

Dr. Harmon concluded his talk by demonstrating a miniature classroom in which posture-designed desks and chairs could be moved about and lighting fixtures arranged in different ways to show various conditions.

Sampling School Lighting

After Dr. Harmon's talk in San Francisco, Doyt Early, architect, Division of Schoolhouse Planning, Sacramento, reported on brightness tests conducted in a large number of California schools assisted by John Walsh and Foster Sampson. Readings were taken with and without artificial illumination and in so-called "daylight" controlled schools.

Standards for Schools

Dr. Leland H. Brown, Stanford University, past regional vice-president of IES, spoke briefly to review the background of the American Standard Practice for School Lighting and its objective of arriving at acceptable standards with existing equipment in the market which met the brightness, lumen output and other factors required. In the West where higher sky brightnesses are common, engineering judgment must be used in connection with the standards. Likewise, said Brown, the engineer could always make the lighting better than called for in these minimum standards.

Office Lighting Standards

J. W. Greenlaw, president, Lighting Materials Ltd. of Winnepeg, Canada, explained that the recommended standards for office lighting are levels of today, limited by economics of the day, and therefore minimums only. The application engineer has needed further explanation, now found in Dr. Luckiesh's paper last April, on footcandle levels, threshold, ideal, optimum and recommended.

"Research and application engineers have made the mechanics of planning for these results relatively simple, too simple in many cases for the good of the lighting industry and the ultimate user," he said. The next logical step is to improve the *quality*. "I think it was a real step when we started thinking in terms of brightness engineering . . . Immediately we consider lighting from this point of view the entire surroundings in addition to the immediate task assume importance. The end result we are seeking is the health, comfort, well being and efficiency of human beings."

Factors that enter into this quality phase, said Greenlaw, are: (1) The light source. (2) Secondary reflecting areas. (3) Floor, desk tops and furniture. (4) Types and color of paper, print size, etc. (5) The window—"we should extend our research and design windows which will use more effectively natural lighting and retain the elements of good lighting."

Greenlaw concluded by noting that there are frustration, confused thinking and difference of opinion among application engineers that emanate from the publications of the results of research, even to quantity. As to brightness and environment, researchers ask for reduced contrasts while decorators seek relief and stimulation with contrasts. There is need for some basic understandings and agreements.

Importance of Illumination Design Data

For the practical use of a large number in the lighting industry there is so much good sense and sound advice in the paper presented by James H. McCulloch, Sunbeam Lighting Co., Los Angeles, at the Portland meeting, that it will be published in greater detail separately in a later issue. His reasoning was that manufacturers have a responsibility to the customer to furnish factual data and illumination curves from recognized laboratories so that architects, designers and engineers can furnish the ultimate user with satisfactory results.

NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

Utilization Data Sheet No. 54

SUBJECT: Aluminum heat treating.
FIRM: Western Light Metals.
ADDRESS: Spokane, Wash.
OPERATION: Aluminum casting, treating and finishing.
SUBMITTED BY: Edwin M. Atwood, industrial engineer.
COMPANY: The Washington Water Power Co.
DATE: Dec. 30, 1948.

This plant produces aluminum mold castings of all types. Many of the castings are for use on truck bodies and are subject to considerable stress. The plant maintains an X-ray department to check castings for defects.

Castings are finished by the use of power chisels, grinders, and sand blasters, one or all three operations being used on a casting, depending on its shape and finish.

Temperature Control

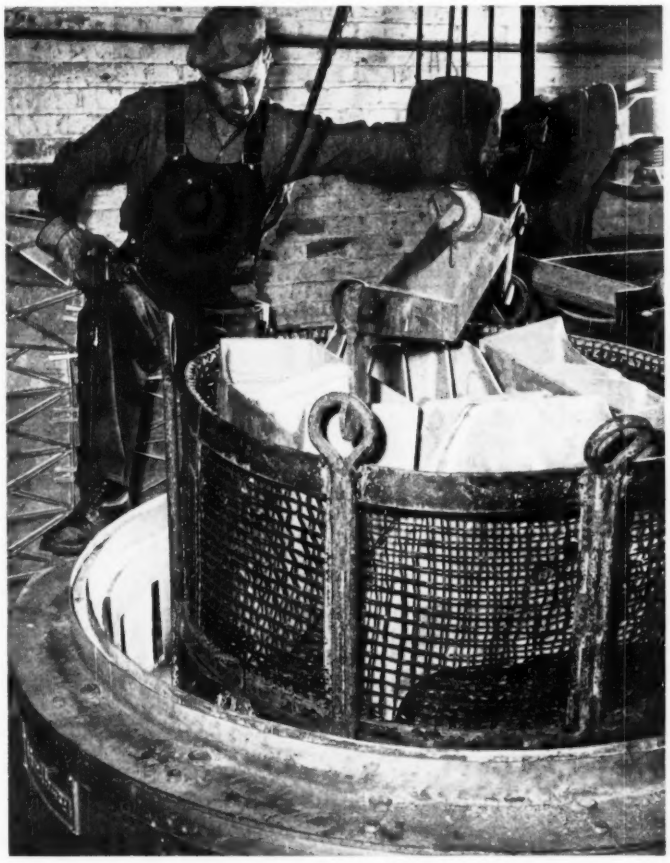
Heat treating of these castings requires very close temperature control, as to rate of increasing temperature on the cold castings, the rate of cooling, and the holding temperature. In most cases 90 kw. are required to bring the oven up to temperature at the proper rate. Thus the demand is established and there is no advantage in reducing the connected load during the hold period. If manual methods were employed to turn off part of the furnace heaters, there would be a chance that they would be left off when needed and spoil some castings. Thus, complete automatic control is desirable. The entire oven load is equipped with an on-off type of control.

Advantage

Advantage of this type of furnace is that it gives precision heat treatment. The charges are heated uniformly and at the exact temperatures required. By controlling the temperature on the quench tank, the cooling rate can be controlled accurately to complete the heating cycle.

Heat treating equipment in plants:
Two 90-kw. Lindberg furnaces
One 10-kw. quench bath
One 5-hp. fan motor

Test equipment was installed and test data taken on one 90-kw. furnace, the quench tank, and the fan motor. Furnace is operated between 900 and 1,000°F. Results are shown in table at right.



	Furnace Kwh.	Fan Kwh.	Quench Kwh.	Total Kwh.	Pieces per Heat	Lb. per Heat
1st heat	480	40	75	595	262	1,121
2nd heat	560	40	85	685	505	1,292
3rd heat	480	40	..	590	566	1,451
4th heat	480	40	95	615	187	1,082
5th heat	480	40	70	590	463	1,126
6th heat	560	40	..	600	309	1,212
7th heat	480	40	..	520	184	983
8th heat	480	40	120	540	266	1,035
				4,735		9,302

0.509 kwh. per lb. of metal

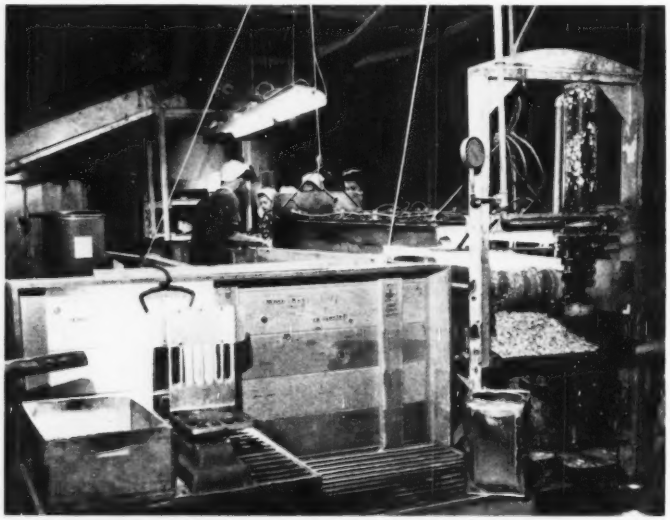
NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION

Utilization Data Sheet No. 55

SUBJECT: Infrared softener for dehydrated onions.
CUSTOMER: J. R. Simplot Co.
TYPE OF OPERATION: Dehydrator.
SERVICE COMPANY: Idaho Power Co.
PREPARED BY: E. E. Harcldsen, commercial representative.

J. R. Simplot Co. Dehydrating Plant, one of the largest during the war, has experienced considerable difficulty in packing dehydrated onions in cans because of the brittleness of the dried onions. The onions, when packed, would break into small pieces and, when used, they would not restore to the original form. The problem was to soften the onions for packing without adding moisture.

After experimenting with heat radiated from steam pipes, and glow heater elements, William Evans, plant electrical supervisor, tried infrared lamps. Four lamps were installed in three rows, ten inches apart with 12-in. spacing between lamps. The center row was staggered with respect to the two outside rows. The traveling belt is three inches from the bottom of the lamps.



Results

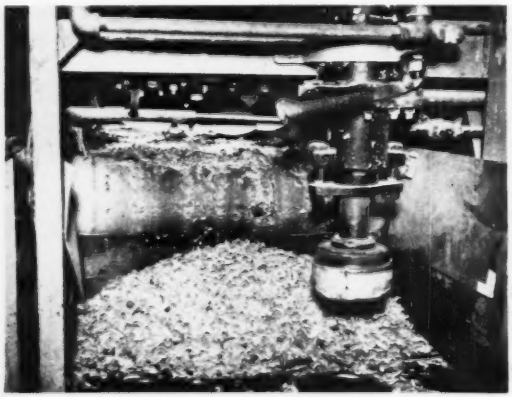
The dry and brittle onions are softened by the heat, so that when they drop into the packing tray, they may be packed in the can by the tamper without breaking into so called "fines."

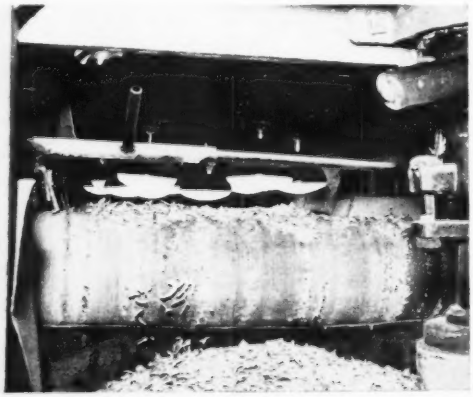
Customer is well satisfied with the results obtained because it (1) eliminates the "fines," (2) enables faster packing and (3) is economical.

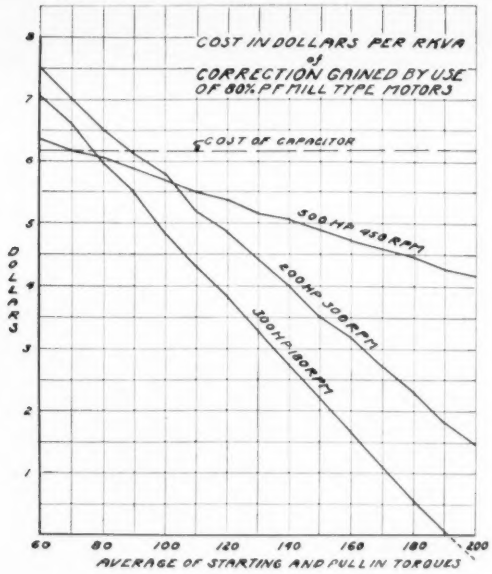
Picture 1 shows a view of the packing room where final inspection is made, the infrared lamp installation, and the can to be packed. Picture 2 is a close-up of the tamper and the lamps are in the immediate background. Picture 3 shows a close-up of infrared lamps over the traveling belt.

Operating Data

Conn. load of infrared lamps	3 kw.
Hours operation per day	24
Dehydrated onions (pounds packed per day)	5,000







Low Power Factor in Industrial Plants and what to do about it

W. C. King
Los Angeles

VII. Is it economical to go to leading power factor on a high-torque mill-type motor?

In article V we found that in many cases the cost of power factor correction obtained by going to an 80% PF slow-speed motor was less than the equivalent correction with capacitors. But the kind of motor we were talking about consisted simply of a rotor and stator and was designed with the low torques that are sufficient for compressor operation. Suppose we have something like a line of rubber rolls in a tire factory or a ball mill in a cement plant? These machines require high torques and the motor must be furnished complete with shaft, base and bearings.

Take for example a load with the following requirements:

Hp.	300
R.p.m.	180
Starting torque	150%
Pull-in torque	110%

We work out the motor price as follows:

Cost of 1.0 PF engine-type motor with std. torques	$ 5,316
Add for 130% avg. torques: 46%	2,447
Add for shaft, brgs., etc.: 36%	2,794
	$10,557

We see that we have almost doubled the cost of the original motor and, off hand, we might think this was the last place in the plant to look for power factor correction. This might be true if we simply added 20% for leading power factor as we did in article V. But in the case of the 80% PF high-torque motor the addition for torques is only 60% of that for the 1.0 PF machine. For the motor above, it works out like this:

Cost of 1.0 PF motor	$ 5,316
Add for 80% PF: 20%	1,063
	$ 6,379
Torque addition is 60% of 46%, or 27.6%	1,760
	$ 8,139
Add for shaft, brgs., etc.: 36%	2,930
	$11,069

This gives a net increase in the cost for the 80% PF motor of $512. At this rating the cost of control is the same for 1.0 and 80% PF but the latter requires an exciter costing an additional $96. This gives a total difference of $608. Let's see how much correction we get for it.

Efficiency at full load = 90.5%

$$\text{Then kw. input} = \frac{300 \times .746}{.905} = 247$$

At 80% PF. rkva. = .750 x 247 = 185

$$\text{Then cost per rkva.} = \frac{608}{185} = \$3.30$$

This is considerably less than $6.20 per rkva., the average cost of capacitors.

Three typical motors were selected and the costs worked out for average torques from 60% to 200%. These were then plotted in Fig. 1. (An average of 200% torques is considerably higher than ordinarily required but the curves were drawn to cover the most extreme cases.) It will be seen that for motors of 200 r.p.m. and below, designed for unusually high torques, the cost per rkva. of correction reaches a very low figure. In some cases it will be found that the cost of the 80% PF unit is actually less than a unity machine; i.e. a 300-hp., 130-r.p.m. motor with 200% average torques.

We should, of course, consider the matter of efficiency, just as we did in article V. The 300-hp., 1.0 PF, 180-r.p.m. motor we worked out above has an input of 243.3 kw. as against 247.1 for the 80% machine. This difference of 3.8 kw. would amount to 19,000 kwh. if the machine were operated 5,000 hours per year. Assuming a power rate of $.0085, this gives us a charge against our power factor correction of $161.50 which must be taken into account in arriving at the net saving.

The next article will discuss the case of the medium-size compressor; should it be driven by a slow-speed synchronous motor, or should the compressor be belted to a high-speed induction motor?

WESTERNERS WIN SALES AWARDS

Kitchens, range and water heater, home service and lighting promotions take top honors

Four winners in national awards given at the Edison Electric Institute annual sales conference were Westerners. Two Hughes awards and two McCall's awards were presented for outstanding sales promotional and home economics education respectively to representatives of Western utility companies. Utah Power & Light Co. and Southern California Edison Co. won Hughes awards, and Lucile Ramirez, Washington Water Power Co. home economist, won first McCall prize; Marguerite Fenner, Pacific Gas and Electric Co. (a former winner), won first prize in a class of awards for single ideas of exceptional merit in home economics work.

Promotion

Southern California Edison won in class 1, the electric kitchen, for its active promotion of electric kitchens through a wide variety of promotional methods. Leonard C. Truesdell, Hotpoint vice-president, presented the George A. Hughes award to Henry C. Rice, merchandise manager, Edison, on behalf of his organization.

Utah Power & Light Co. won in class 2, domestic electric range promotion. Award was presented to Roy H. Ashworth, vice-president, W. A. Huckins, sales manager, and J. F. McAllister, residential sales manager, also were present for the reception of the award.

Over-all Program

Mrs. Ramirez was given the class A, or top award, by McCall's A. P. MacNamee and Miss Camille Davied, executive editor, McCall's. The award in this class goes for the outstanding over-all home economics program by a large utility over the full range of activities.

A. P. MacNamee of McCall's magazine presents top Division A award to Mrs. Lucile Ramirez, home service director, Washington Water Power Co.

Marguerite Fenner, winner of another McCall's award, for home lighting demonstrations to schools by PG and E home economists all last year and this

Another type of award was initiated by McCall's this year for special promotional or educational programs with intrinsic merit in themselves. It was in this class C that Miss Fenner, winner of the 1946 class A award, won extra recognition for PG and E's demonstration, "Light is What You Make It," presented 166 times before a total of 23,215 students in northern California public schools, approved by the California State Department of Education.

Hotpoint's Leonard Truesdale presenting 1948 Hughes award trophies, at left to R. H. Ashworth, Utah Power & Light; and at the right, to Henry C. Rice, Southern California Edison Co. H. M. Sawyer, chairman of awards committee, Edison Electric Institute, at center. Awards were made at EEI annual sales conference, at Chicago, April 7

ELECTRICAL WEST

Sales Guide

News Letter

FOR THE ELECTRICAL MERCHANT OF THE WEST

May 1949

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Our Washington bureau tells us there's not much chance excise taxes will be cut by Congress. Uncle Sam needs the dough to save Europe, stop Communism, finance everyone's doctor bills and feed the bigger and better bureaucracy. But Regulation W is loosening up credit restrictions, and may die come June. Bad news is the attack on Fair Trade laws. Florida state supreme court overthrew that state's fair trade law. A Mississippi lower court ruled against that state's law. There's a bill up to repeal the Miller-Tydings Act under which the fair trade laws operate. A House judiciary committee is after the anti-monopoly situation and may dig into the fair trade laws. It won't help any that John Carson, propagandist for the Cooperative League, has been named to the Federal Trade Commission. A new wage-hour bill before Congress will include retailers, now exempt, doing $500,000 annual volume, jack up the overtime point, decides who is an executive, etc. Supreme Court by a tie decision, left the basing point pricing situation right where it was, snafu.

From Rock Candy Mt.

Something the FTC might better do is to get after the plumber-installation of-appliances-sold-by-dealers racket, which is becoming a national scandal. Dealers are afraid to squawk for fear of local reprisals and so the customer gets soaked an unholy price for $10 worth of labor and $1 worth of pipe.

Plumbers racket

Dealers in New Mexico, where there's so much military stuff, (as well as those wherever there are military camps), gripe justifiably because of the discount selling by tax-free and government-overhead-subsidized post exchanges. Its the same with the co-ops. Who is going to pay for all the government beneficence if retailers cease being tax collectors?

PX pets

Excise taxes on rebuilt domestic refrigerators is something to watch out for. The BIR boys swoop in, demand the books, and decide themselves which sales, already made and gone, should have had excise as remanufactured products, when perhaps all the old box had was a new gasket. Then there's penalties to pay! Entering the trade-in market, this is something to watch out for.

Excise on the exs

It is quite likely that the one show into which most manufacturers and distributors will go in Los Angeles is the Home and Building Exposition, June 2-12, at Pan-Pacific Auditorium. Last year the holding of two shows was pretty costly on electrical participants. That's not official, but rumor.

Home Show

Better name wanted

A better name is wanted by NEMA for what are variously called "traffic," "small," "table" appliances. Traffic means nothing to consumers. The other two names aren't inclusive enough. So the domestic appliance section of NEMA is asking for everyone to ballot on either "small electric appliances," "portable electric appliances," "electric traffic appliances" or "electric housewares." Send your vote to NEMA Statistical Dept., 155 44 St., New York.

Where's Elmer?

New field organization is announced by National Appliance & Radio Dealers Assn., with Russell B. Rennaker as director. Jerry Dicus, Los Angeles, is West Coast regional director with southern California, Utah, Colorado, Nevada, Arizona and New Mexico. More appointments are promised to fill the five regions and representatives for each state.

Gas freeze

Gas hasn't got it in Utah, for the Public Service Commission there put a freeze on gas heating service. No conversions from other fuels and new applications only from those who applied and had foundations completed by June 30. Industrial and commercial customers can't increase their use.

Stimulant

Booth's Radio & Appliances of Bakersfield proved that off-season promotion, while not often wise, can boost sales. It held a washer carnival in January and February which held its washer sales to within 9% of its 1948 all-time high for those months.

Electric campaigns cooking

Promotions and campaigns are bursting out all over. A quick summary: The Go-All-Electric campaign was given a big revival at the Rocky Mountain Electrical League conference in Cheyenne, April 21-22, and will blanket the area. . . In Utah the Intermountain Electrical Assn. took the Utah Power & Light Co. sales plans and program to each of its branches. J. F. McAllister did the pitch. . . The Northern California Electrical Bureau launched its big Electrical Living campaign and contest at a shove-off breakfast at the Mart in San Francisco, April 22, and the fluorescent banners are to fly from May 1 through June 15 in hundreds of dealer stores north of the Tehachapi. Sacramento Electric League and Coast Counties G & E are tying in too. . . Southern California Edison and distributors are hitting the area with a '49er gold digging campaign on ranges and water heaters, using the new national catchline, "Of Course—its Electric". . . And a three-ring circus is going on in San Diego, with the Bureau of Radio & Electrical Appliances big Ironer Demonstration Week, participated in by 110 dealers all demonstrating, and 13 makes of ironers advertised and given as prizes to people who actually iron; plus a sales institute of three sessions. . . Inland Empire Electrical Dealers Assn. is putting on a big promotion to tie in with exhibits at Spokane Home Show in late May.

TV in news

Are utilities backing television? Sure! Utah Power & Light started a television broadcast, "Better Living Electrically" featuring its home economist director, Evelyn Hansen and Mrs. Vilate White, in an all-electric kitchen over KDYL-TV in Salt Lake City, a half-hour live show, 3 to 3:30 each Wednesday afternoon. Los Angeles Dept. of Water & Power is talking of a similar homemaking program. . . Other TV news—San Francisco's second station, KGO-TV, the ABC station, goes on the air with programs and a well-merchandised promotion, May 5. It will do the Oaks baseball game at the Oak's park. . . Another ABC station, KECA-TV will open in Los Angeles soon. . . In Seattle station KRSC-TV gave a report of television progress, T-day plus 5 months, at the Association of Appliance Dealers, April 27. . . San Francisco's proposed inspection ordinance

on antenna was withdrawn for redrafting since it would have delayed users as much as a month. Fire department is concerned lest antenna hinder fighting roof fires. . . Phillips is a big name in lamps and radio in Europe. This Dutch company escaped the Nazi and set up North American Phillips in the East to make tubes for war radio. It has said that though it makes complete TV sets in Holland, it is content to make components and tubes for American set makers here. Will soon have a new projector unit to throw a 3x4 ft. picture.

Hoffman Radio Corp. of Los Angeles showed its handsome complete line of new TV, radio and combination phono sets in a series of Western meetings in April. Les Hoffman, president, said TV in San Francisco was following same acceptance pattern that it did elsewhere; would pick up fast after a second station came on. Claims the first 16-in. UL approved set to be delivered, has concentrated on 16-in. sets more than others. He said obsolescence fear was phoney, color wouldn't come for a long, long time. Prices can't come down much. Hoffman showed sets with special color filter lens in front and others embodying the various speed record changers. Advocated, "Sell the Show." Big picture

Harvey Hubbel Inc. has brought out a new convenience outlet receptacle that the kids can't get into with a bobby pin and get a shock. Safer

A couple of boys who started peddling electric irons, door-to-door, in San Diego way back in early days, have made good. Larry Klauber was advanced from president to chairman of the board of San Diego Gas & Electric Co., and "Doc" Holloway from sales vp to president. Hi Dillin, a mere youngster becomes vp of sales. And in Riverside Bill Fleming, merchandise manager and sales manager of California Electric Power, has become special agent. Alger stuff

City of San Francisco's Department of Electricity rule prohibiting service entrance cable was protested and tempered with mercy. The cable can be used for range and water heater installation in existing residences. To ban it would have hiked the standard $75 price worked out after long process between dealers and contractors. Cable oked

"Little Joe" certainly knows his toast. Sunbeam Corp. sent Al Widdifield, its general sales promotion manager, throughout the West with Charlie Moore to unveil its newest creation, a radiant control automatic toaster that is really automatic. No levers to push. Toast lets itself down gently by expansion of heating element wires, turns itself off by radiant heat of the finished toast. It is better than human. Makes no difference how moist or dry the bread, it knows. Little Joe watches it. New fascinating device has the old F-9 price of $22.50. Stocks are available in a month. No more pop

There's a good market for adapters to convert bare lamp fixtures and lamps into good seeing comfort lighting. Myrtle Fahsbender, director of home lighting for Westinghouse proved it in many talks and demonstrations while on a tour of the West. There is also profit possibility in selling CLM lamps. Cash converters

O. B. Wilt is showing at the Mart in San Francisco a new small Economaster matching range with three top elements and a 20-in. oven, to go alongside its same size water heater (20, 30 or 40 gal.) with three more range elements on top, both taking the space of a single large range. Tabloid package

The 1949 National Housewares Directory, published by the Associated Pot and Kettle Clubs is better than ever. Has 468 pages, listing 1500 types of products of 6000 manufacturers and 15000 trade names. Worth its $10 price; obtainable from its office in Western Merchandise Mart, 1355 Market St., San Francisco.	Who makes what
Kaemper Barrett Dealers Supply is the new name since Kaemper-Barrett merged with Dealers Supply Co. of Berkeley, distributors of electronics and industrial equipment. The company has built a new building at 1850 Mission St., San Francisco, from which it will distribute a wide variety of electric appliances and allied lines.	New name
Hobart Mfg. Co. of Troy, Ohio, makers of bakery mixers and the domestic Kitchenaid, will soon have a new dishwasher, to sell under $300, "of course its electric," automatic and with hot air drying.	Aids dishes
Trav-ler Radio Corp. of Chicago will start promotion in May of a new line of television sets at from $249.95 to $349.95, with push button tuning.	Buttons
Tel-a-See, combining radio, TV and a movie projector, with three screen sizes, for home use or display advertising, has been designed by Fred Forney of Cincinnati.	Home show
Buckeye Electric Mfg. Co., makers of heating elements has been purchased by Dominion Electric Corp. of Mansfield, which also operates Majestic Electric of Galion, Ohio.	Merger
Interstate Engineering Co. of El Segundo, Calif., will go national on its advertising of its Compact vacuum cleaner.	Eastward
Trend seems to be that prices are coming down on appliances: 13% reduction announced by Thor lowers prices on its clothes washers, dishwashers and combination units, and has brought out a low priced line of washers at $99.50 and $109.50 with pump. . . Westinghouse has dropped prices from 20 to 50% on nine of its radio models. Reductions apply to five phonograph combination consoles with AM and FM, individual table, consolette and console models with phonograph and AM, and one standard band table model.	Price drops
Gibson too has reduced prices on some models in its refrigerator and range lines. . . International Harvester has cut prices on its 1949 refrigerators averaging about 8.3%. Biggest reduction is on its standard model. Home freezer prices remain unchanged. . . Coolerator announced price drops ranging from $10 to $25 on all models in its refrigerator and electric range lines.	More
Opportunities for home economists in the electric utility industry are stressed in an eight-page, two-color booklet titled "Make Home Economics Your Profession," put out by Edison Electric Institute. Is available from EEI, 420 Lexington Ave., New York 17, at $5 per 100 copies.	Good job
Fall show dates for the Gift, Jewelry, Toy Stationery and Housewares Shows on the West Coast are: San Francisco - July 31-Aug. 4, concurrent with Summer Market Week at the Mart, Aug. 1-6; Seattle - Aug. 14-18; Portland - Aug. 21-24.	Show dates

ELECTRICAL WEST

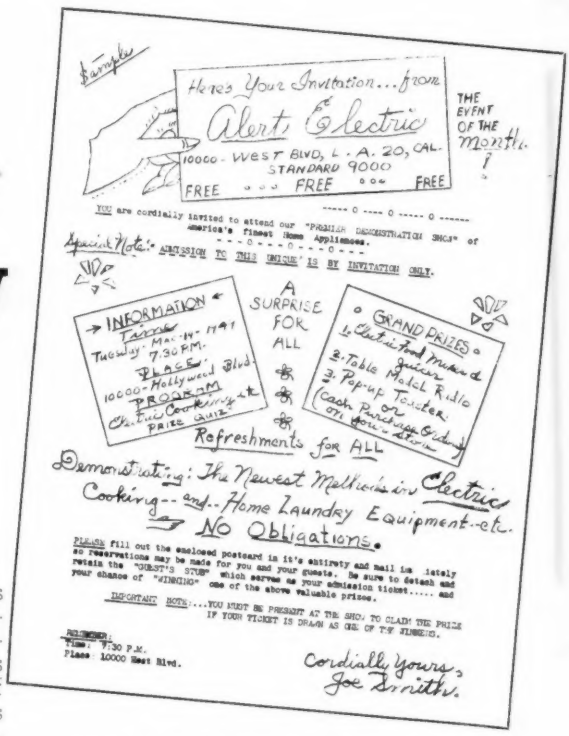
Sales Guide

FOR THE ELECTRICAL MERCHANT OF THE WEST © MAY, 1949

How to

ROLL YOUR OWN SHOW

demonstration and appliance


Sample
Here's Your Invitation... from
Alert Electric
10000 - WEST BLVD, L. A. 20, CAL.
STANDARD 9000
FREE FREE FREE
THE EVENT OF THE Month
You are cordially invited to attend our "PRAISE DEMONSTRATION SHOW" of America's finest Home Appliances.
Special Note: ADMISSION TO THIS 'SHOW' IS BY INVITATION ONLY.
INFORMATION
Tuesday - May 14 - 1949
7:30 P.M.
PLACE
10000 - Hollywood Blvd.
PROGRAM
Electric Cooking etc.
PRIZE QUIZ
A SURPRISE FOR ALL
GRAND PRIZES
1. Electric Food Mixer &
2. Table Model Radio
3. Pop-up Toaster
(Each Prize in Original Carton)
Refreshments for ALL
Demonstrating: The Newest Methods in Electric Cooking -- and Home Laundry Equipment etc.
NO Obligations.
Please fill out the enclosed postcard in it's entirety and mail immediately so reservations may be made for you and your guests. Be sure to detach and retain the "GUEST'S STUB" which serves as your admission ticket..... and your chance of "WINNING" one of the above valuable prizes.
IMPORTANT NOTE:...YOU MUST BE PRESENT AT THE SHOW TO CLAIM THE PRIZE IF YOUR TICKET IS DRAWN AS ONE OF THE WINNERS.
REMEMBER:
Time: 7:30 P.M.
Place 10000 West Blvd.
Cordially Yours,
Joe Smith.

A simple procedure that **works** and brings **results** to dealers that have used it, is suggested by Howard Burdick, who as supervisor of dealer relations for Los Angeles Department of Water & Power has plenty of chance to see the plan operate. Here is his suggested outline of procedure for promoting live electric appliance demonstrations to increase direct sales in retail stores:

First objective is to get **customers**—to bring attendance to your store. To do this—

Use selected mailing list derived from,

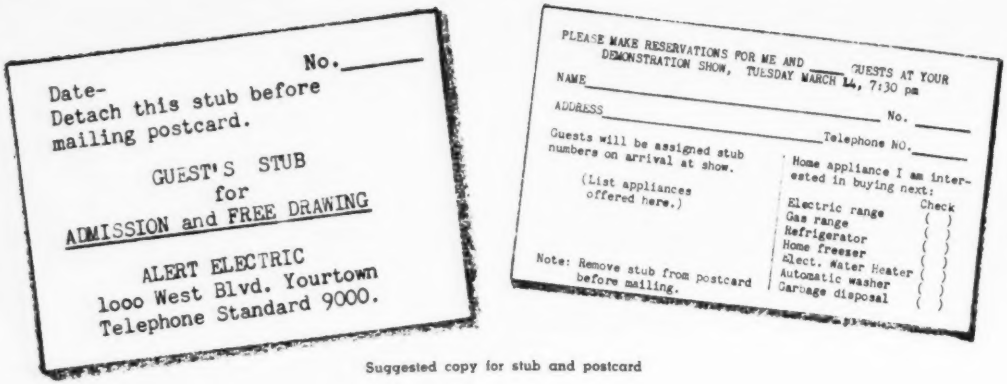
1. Your previous customers, first.
2. Your service and repair records.
3. Neighborhood clubs, churches, chamber of commerce, etc.
4. Reverse telephone directory covering your area.

Next, use direct-mail invitations. Send them first class, 3c postage. Send invitations **not more than one week in advance. Evening meetings** are preferred, on Tuesday, Wednesday and Thursdays. (Friday and Saturday are poor nights.)

Plan for 10% or more attendance.

Cost will be between $75 and $100 per meeting. (See example below.) Assume you have a mailing list of 500. Plan for 50 to 75 people. Therefore arrange space and seating capacity for that number.

Use simple, plain invitations. They can be mimeographed announcements, similar to the sample shown here. Pastel-colored paper draws more attention.


No.
Date-
Detach this stub before mailing postcard.
GUEST'S STUB
for
ADMISSION and FREE DRAWING
ALERT ELECTRIC
looo West Blvd. Yourtown
Telephone Standard 9000.
PLEASE MAKE RESERVATIONS FOR ME AND ____ GUESTS AT YOUR DEMONSTRATION SHOW, TUESDAY MARCH 14, 7:30 pm
NAME
ADDRESS
No.
Telephone NO.
Guests will be assigned stub numbers on arrival at show.
(List appliances offered here.)
Note: Remove stub from postcard before mailing.
Home appliance I am interested in buying next:
Check
Electric range ( )
Gas range ( )
Refrigerator ( )
Home freezer ( )
Elect. Water Heater ( )
Automatic washer ( )
Garbage disposal ( )

Suggested copy for stub and postcard

Use penny postcards with your name and address stamped on for return mailing. List the prizes offered and a check list of "home appliances interested in buying next," on reverse side. (See the sample above.)

Use ticket stub on postcard for drawing. Both postcard and stub should have the same number. Postcard is mailed to you. Prospect holds stub.

PRIZES

Be sure to itemize a list (minimum of three) of prizes offered, **all free, without obligation, except for attendance in person.** Note: use "scarce" needed merchandise for the main prize, such as a mixer, electric blanket, etc. Offer **cash purchase certificates** good only at your store as alternatives.

PROGRAM

Start promptly at 7:30 p.m. Close promptly at 9:15 p.m.

Use the first five to ten minutes to get acquainted. Express welcome, appreciation for coming, and purpose of demonstration. Give each person a carnation or rose if convenient.

Do not have too long a program. Feature one or two items, such as electric range and home freezer, or laundry equipment and water heater. Have all merchandise, including traffic appliances, arranged for easy inspection. Have all that you can working. Show prices and data on each.

Put on, or have someone who is trained to do so put on, a demonstration as you explain and tell the advantages. Rehearse this so that it will be smooth.

Keep record of attendance. Separate prospect follow-ups and make follow-ups as soon as possible. Each one who has attended serves you or the salesman as a friendly door opener.

REFRESHMENTS

Serve light refreshments, such as coffee, cokes, donuts, ice cream, cookies, etc. at the close of the meeting, while preparing for the drawing. This allows people to look around at the merchandise.

Close the meeting with the drawing, the major prize last.

Be prepared to make and close any sale right there and then. have sales personnel present and alerted. Arrange with prospects for home calls or personal demonstrations.

Simple as this is, the plan works and brings results. It uncovers many prospects for you to follow up and work on.

Approximate Cost

500 mimeographed announcements	$ 7.50	
500 envelopes and 3c stamps	18.00	
500 postcards, mimeographed and return numbered, addressed, with list of appliances interested in buying next.	12.50	
500 ticket stubs, numbered	2.00	
		$ 40.00
Prizes to be given free or cash certificates good only at your store		45.00
Refreshments for 75 people at 20c each (coffee, cup cakes, cookies, doughnuts, ice cream bar, etc.)		15.00
Total expense, approximately.		$100.00

Runs Own Cooking Schools

Show window front of entire store gives clear view into the kitchen auditorium on the left half of the store. Entire building aids in selling major appliances

THERE *is* such a thing as growing to a plan. In Pocatello a prime example of it is Mountain Electric Co., whose 60-ft.-wide store on Center at Third St. is now completed. Delayed by priorities and shortages, it now has its final touches that make it an exceptional, compact and versatile electric sales, service and wiring organization in that fast-growing Idaho industrial center.

A. R. Woolley, its president and general manager, had such a plan way back when he moved his electrical and appliance department out of Bistline's Idaho Lumber Co. and set up a separate company as Mountain Electric, during the war. The plan was to create a store with its *own* kitchen auditorium, where cooking and laundry schools could be held and demonstrations conducted, instead of holding them in a theater or auditorium away from and not identified with the store. For, thought Woolley, once a Hotpoint field man, with shorter postwar margins, it would be preferable to bring people to the store, if possible, instead of sending salesmen to their homes.

Around this auditorium idea the arrangement of the store was wrapped. The store front is a pair of huge show windows, from ceiling to sidewalk, both slanted inward to face the traffic stream along Center St. Left half of the store contains the auditorium, with a raised stage at the rear on which is a complete working electric kitchen. Along the left side are Hotpoint unit kitchen centers, such as the preservation center, preparation center and cooking center, with cabinets that go with the refrigerator, sink and range, respectively. Along the center wall, dividing the large store in two, the radios are arranged in homelike display with home lighting fixtures above. The center area is used for auditorium seats during schools, demonstrations, etc, or for mass display of major appliances at other times.

Mrs. Woolley, former utility home economist, can conduct the schools and demonstrations. Sometimes the factory demonstrators are featured. Mrs. Woolley also aids customers with any cooking problems, as necessary.

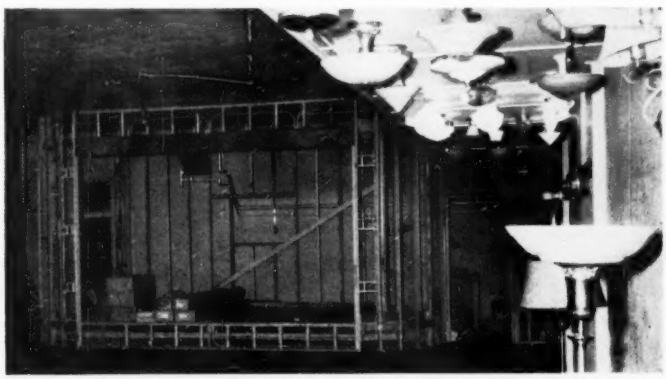
Another thoughtful idea is the location of the demonstration rooms for washing machines, ironers, dryers, in the basement. There a housewife can take her own washing and try out the automatic washers, etc, in privacy. This she appreciates and the salesmen find it makes a sale much surer.

The building has many other well-planned facilities in all departments. The appliance service department is in the large basement, reached easily by a wide stairway at the left side of the store. Time payments are paid at the office downstairs. There is a small sales conference room there too, and storage rooms for heavy appliances, commercial appliances, and stock at the rear. A large freight elevator at the rear permits loading such things easily onto trucks at the rear entrance. The wiring shop, with offices, estimating and engineering rooms, is at the rear of the right side of the main floor. The motor repair shop is in the basement under the wiring shop.

About a year ago John Jackson, another Hotpoint man, joined Woolley's organization and is in charge of merchandising. With two such sales-minded men, and a plan to work to, Mountain Electric is one of the aggressive selling forces in the state. Ad Woolley has just recently been elected president of Idaho State Electrical Contractors Assn. Thus he is equally active in the electrical construction side of the business. Other officers of the concern are R. H. Wells, vice-president; Bret R. Woolley, secretary, and Claude Bistline, treasurer. William H. Walker is outside foreman; William R. Holt, shop foreman.

● SOME 4,000 home economists, extension specialists and homemakers will meet in San Francisco for the 40th annual national convention of the American Economics Assn. from June 28-July 1. Headquarters will be at the Civic Auditorium where manufacturers of electrical equipment and appliances will exhibit their latest equipment. Preceding the annual conference the Home Economists in Business will hold a pre-convention meeting, June 26 and 27, at the Palace Hotel. With the theme, Mrs. America—1949, the program will be devoted to electricity in the home.

Two years ago the stage kitchen was roughed in but appliances were not yet available. Now the kitchen is finished and works to promote sales and service



EMEA SHOW

EACH year expanding in numbers of exhibitors, quality of showings, numbers of interested persons attending and consequently in size of auditorium, the Electrical Maintenance Engineers Assn. of Southern California topped its record again, late in March, with its Industrial Electrical Show, at Shrine Auditorium, Los Angeles. This association-owned-and-operated industrial show measures up to any staged by exposition professionals and in many details is far more "on the beam" so far as the industry is concerned. Its attendance is limited to interested persons—maintenance engineers and electricians, plant superintendents and managers, owners, contractors, inspectors, consulting engineers, utility power consultants, manufacturers and distributors—in other words those who use, make or distribute electrical industrial equipment. Exhibits from 68 firms included lighting, commercial and industrial electrical equipment, materials, tools, communication systems, instruments, electronics and industrial heating. Some exhibits, such as the Cutler-Hammer, Westinghouse, General Electric, Allen-Bradley and others, were elaborate, with working mechanisms on demonstration. Others were simple

Even the much bigger Shrine auditorium was filled with 68 exhibits of interest

Tri-State gal gave everyone a large envelope in which to carry literature

Sunbeam, like other lighting manufacturers, furnished its own drop ceiling

EMEA President Mike Eversz, past president, Henry Ledeboer, and contracts chairman, Frank Rohring, were busy getting door prizes ready for drawing

AND HOW!

and showed new materials or devices available. There were at least six industrial electrical contracting firms having displays and indicating the repair and installation service they are prepared to render. Practically all exhibitors reported good volume of orders and many prospects and excellent contacts for future business.

Experienced by former shows, the committees of members of EMEA handled all details skillfully. William H. Slater, Emsco Derrick & Equipment Co., was show chairman; F. J. Rohring, Southern California Edison Co., handled contracts; Harold Davis, General Electric Co., publicity; Ray Gunning, Larsen-Hogue Electric Co., electrical facilities; Henry Bush, Littlejohn-Reuland Corp., entertainment; and Earl S. Mollenkopf, Hoffman & Jacobs, and Paul Shrader, consulting engineer, properties.

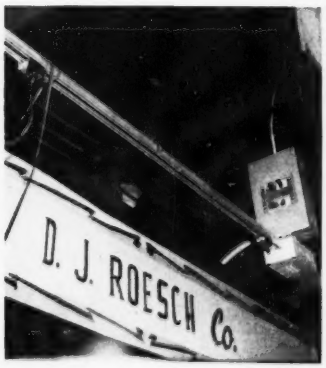
Members made backgrounds, installed them, installed an adequate wiring distribution system employing 3-wire bus for 220 and trolley duct for 110, all of which is dismantled, stored and used again in succeeding years. Profits from moderate space rentals go into promotion of the show, and toward operating costs of the association.

Fred Macfee explained an S & M cutaway of enclosed reflector to prospects

Locally manufactured Pryne built-in unit with separate connection box

Chubby Gerhardt, back in swing with Pyle National, shows a typical exhibit

EMEA owns its show wiring—a 3-wire bus for 220-volt equipment, and trolley duct for 110-volt lighting and devices, protected by multibreakers, salvageable



ELECTRICAL WEST

Orchid For Mr. Jensen

INEVITABLY the day was bound to come when the spotlight would be turned on the machinations that have accompanied the studied attempt to nationalize the electric power industry of the Pacific Northwest. Since the program was conceived, there have been back-alley stories and whispered conversations of "deals" and plots and connivings. There have been rumors and denials. But seldom have there been records of facts to support the stories and the speculation. Elsewhere in this issue there is such a record. It is the published speech of a brave and forthright Congressman who exposes some of the behind-the-scenes activities of the take-over plotting. His recitation of events does not make "pretty reading." We recommend it, however, as a "must" reading for every member of the electrical industry here in the Far West. Read it and the reasons will be obvious.

Too Bad, Mr. Hoover

MAYBE the Hoover Commission was entitled to produce one dud in its series of reports on reorganization of the executive branches of the federal government. However, one regrets that the blank cartridge had to deal with the all-important and highly controversial subject of electric power. The power report, last in a long series, not only made no recommendations on the propriety of federal power development, but it included four widely dissenting statements by members. This failure of the Hoover Commission to resolve the differences between the federal government's power policy (or lack of it) and the nation's light and power industry is distinctly disappointing to the Far West. Most of the existing and proposed federal power projects are in this region. It is here that the ideological battle is being waged on the local level. It is here that the future of the industry is most seriously threatened.

Dissent hinged on the consideration to be given two "task force" reports — one on accounting and the other on engineering. Both took a dim view of the practices and policies of the various agencies engaged in resource development involving power. Both were highly critical of the bureaucracy, the propaganda, the political and economic pressures and the promises held out to the public in connection with such projects. Both doubted whether the taxpayer had received or ever would receive his money's worth.

A strong and compelling report by the Hoover Commission might have produced a badly needed statement of federal power policy. The best that may be hoped for now is clarification and correction of some of the minor differences.

Still Just Around the Corner

ARE the power companies going to give television the same sort of aloof treatment accorded radio when it was aborning? In a discussion of TV just recently one utility sales manager said, "we're going to keep hands off; we're not certain yet just where television is going." A lot of other people are convinced that television not only has arrived, but is here to stay. This sales manager and some of his complacent associates probably haven't heard of a certain New York TV enthusiast. This particular individual enjoys television so much that he has four sets in his den with a swivel chair in the middle of the room. He doesn't want to miss a single program. Maybe he isn't typical, but then neither was the radio pioneer who had three or four sets in his home back in 1925.

A Leaf From the Old Book

IT'S a far cry from the "customer-ownership" security campaign days of the middle twenties to the power company financing problems of today. But the need for capital is as acute and the necessity for public interest and participation even more pressing. Take the case of just two California utility companies. Pacific Gas and Electric will shortly offer 1,500,000 shares of preferred stock, largest issue of its kind in utility financing history. Southern California Edison will market 800,000 shares of common. The

EDITORIAL VIEWS

money is needed to finance the unprecedented construction programs of these two companies. Both issues follow other sizable offerings by both companies and each utility undoubtedly will do more financing. Other Western companies have been or will be in the market for funds—San Diego Gas and Electric, Idaho Power, Mountain States Power, for instance.

Financing of this order tests the capacity of the security markets. To insure reasonable money costs and public acceptance will involve plenty of salesmanship. Some of the same enthusiasm and drive that put over the customer ownership programs of prior years might help the job today.

Engineers' Ambassador

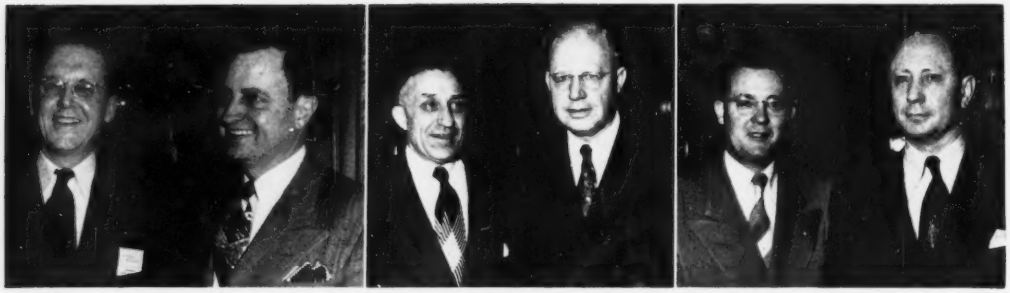
TOO few engineers are adept at publicizing engineering and engineers. Because of this, the stature of engineers in relation to lawyers and doctors is not always what it might be. But in Everett S. Lee, president of the American Institute of Electrical Engineers, who recently has visited the West, the profession has an articulate and an engaging spokesman who not only can but does speak up for engineers. He makes an admirable ambassador for engineers.

No one could fail to appreciate the importance of engineers when he tells of their aims and works in such human and simple terms. "The engineer," he tells his audiences, "listens to all the new knowledge that the researchers bring forth from the laboratories and fashions this knowledge into machines and products for the people to use, to lighten their tasks, to bring pleasure into their lives, to give them higher standards of living."

Then he tells of his relish for baseball games and says that to him the purpose of all engineering is that there can be more ball games. How can anyone then ask if engineers are human?

Not alone to others but to engineers themselves he carries this message. And in urging other engineers to tell the people what engineers do, he advocates that engineers do not spend all of their time in their profession but devote themselves also to community enterprises and civic affairs. For who is so equipped as the engineer to give sound counsel on civic problems?

EVOLUTION becomes revolution when change is greatly accelerated. Our economy is rapidly being transformed from a capitalistic to a "laboristic" economy. Power is shifting to the urban masses. As recently as 1850 over one-half the national income came from self-employment. Today, four out of every five gainfully occupied people are wage earners. We have become a nation of wage-workers. In the early days, the outlook, values and customs of capitalists, business proprietors and farmers set the tone of the political life of the country unchallenged. Their moral values set the standard of the community. They were its intellectual leaders. They were the dynamic progressive element in our economy. In this environment, both the institution and the ethics of capitalism found firm root and were continually revalidated. . . . Today capitalism is living on a backlog of mores and beliefs built up in an early and different environment. Like all backlogs that are not replenished, this one must run out in time. The universal franchise, the march of technology, and the shift of population into the great urban centers have fostered the rise of political power of the urban masses. Our society is passing through one of the great transformations of history, such as occurs once every two or three hundred years. From now on we are likely to have a "labor" government. If not in name, it will be so in fact. This is true of the federal government and is likely to be largely true at the state and local levels. This trend will experience occasional but short-lived setbacks. Organized labor is likely to be a dominant political force from now on. There is nothing in sight to stop this trend, indeed, it is likely to be accelerated.—Emerson P. Schmidt, director, Economic Research Department, Chamber of Commerce of the U. S.



Roach Thrailkill Gamble Bankus Cannon Enns

Boise Meeting Inspires N.W. Engineers

ENGINEERS of the Northwest Electric Light & Power Assn., meeting at Boise, Idaho, in annual conference, received inspiration in the words of T. E. Roach, president of Idaho Power Co., and from what they saw on inspection trips that gave them new courage in their fight against socialized power on their home level. Registration of 240 was near an all-time record despite the long travel to Boise for many. Far away California even had 15 at the meeting.

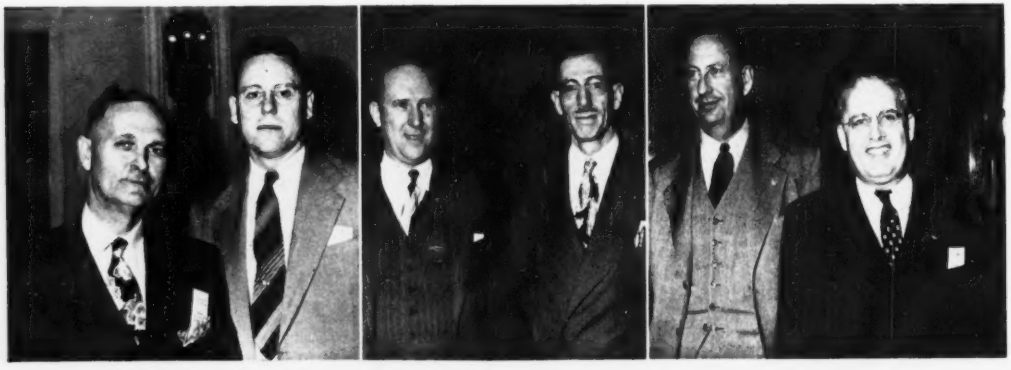
Opening words of encouragement for private industry by Idaho's governor C. A. Robins set the stage for Tom Roach to tell of his company's 230,000-kw. expansion program as an example of what private industry can do under an atmosphere of encouragement. The favorable position of his company has enabled raising large sums of venture capital with assurance of safety and adequate return to carry out this huge program, the largest of any private utility in the Pacific Northwest. The engineer must be careful to spend every dollar wisely, said he, in order that it will not be a burden on his company in the years to come. Roach is proud of the fact that never at any time has any customer or industry been denied adequate power in his territory.

Association president, W. L. Thrailkill, followed in the same vein when he said that the free air of Idaho gives the engineer a free mind. He cited the Idaho Power Co. as a model, it having ably demonstrated what private capital can do under a favorable political climate. Other private utilities of the area are going ahead with power development programs also, he said. Six companies have plans for bringing in 525,000 kw. of new generation. Idaho Power's present 178,000-kw. construction program brings the total to 703,000 kw. Private utilities of the Northwest will spend $100,000,000 this year alone for betterments—half of this for generation and half for transmission and distribution. He called attention to the fact that the total *tax* bill for private utilities of the region is $35,000,000 a year. This is greater than Bonneville Power Administration's annual *gross revenue* and greater than its total *net* during its entire existence. Further, he said, the private utilities have annual operating pay roll of $46,000,000; 13,000 employees; 1,500,000 customers, and gross revenue of $175,000,000.

Technical Sessions

Heading up two and a half years of technical discussion was a program put on by the electrical equipment committee under sponsorship of C. E. Cannon, Waldo Enns, Portland General Electric Co., reported a large switched capacitor program; 6,000 kva. will be added this year, bringing system total to 40,-

Van Atta Walker Shevalier Ellis Kirk Sawyer



Guse

Alger Le Fever

Gordon Setterstrom Duffy

000 kva. Several other utilities reporting on switched capacitors have had a generally satisfactory experience. One company has run into a 30-amp. limitation on air-break switching; another mentioned OCB trouble.

Factory-built substations vs. field assemblies came in for a round of discussion under sponsorship of Corbett McLean, Pacific Power & Light Co. Advantages of both types were pointed out, but it was agreed generally that, despite some assembly problems with present factory products, the unit substation has a very definite place in today's distribution setup and is rapidly increasing in popularity.

A. C. Schwager, Schwager - Wood Corp., described his company's newly developed high-voltage interrupter switch. The switch combines an oil-break with a conventional 69- or 115-kv. air-break pole-top switch to interrupt switch rating of 600 amp. and 1,200 amp. The switch is designed for transformer primary protection in those cases beyond the limitations of fuses and yet where a conventional oil circuit breaker is not economically justified. Operation is automatic with application of standard relay protective systems. Tests made by the Bonneville Power Administration on a 115-kv. preliminary design of the switch indicated a conservative rating of 250,000 kva., and an interrupting capacity of 300,000 kva. without destruction.

New developments in meters were presented by the meter and services committee under Ellis Van Atta, Pacific Power & Light Co. L. Dana Johnson, Sangamo Meter Co., described his company's new differential register meter. This meter has a second or premium set of dials actuated by a differential drive operated from the regular meter shaft and a small synchronous motor. By choice of gears, the meter will record on the differential register all energy consumed above a predetermined demand level. With appropriate rate schedule, the meter would enable the utility to make a compensatory charge for energy used by a consumer above the average demand of his class.

Paul Worthen, General Electric Co., described his company's new magnetic suspension-type I-50 meter. The jewel has been eliminated by the new design making the meter frictionless. Other advance design features have been incorporated in coil construction, adjustments, etc. The thermal-type demand meter eventually will supersede the block interval type, in the opinion of H. L. Buechner, Westinghouse Electric Corp. Simplicity, lower maintenance and good accuracy were reasons given.

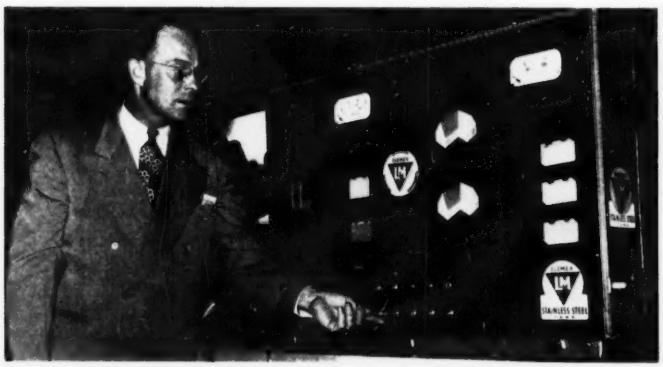
The subject of inhibited transformer oils was opened up for discussion. It was reported that, although such oil is being used by California utilities, operating companies in the Northwest have as yet had little experience to draw from. Several companies are now making tests.

Electronics

Under the electronics committee, L. G. Walker, chairman; T. W. MacLean talked on telemetering; A. A. Noon added to his discussion of a year ago on pulse reflection fault location; Walker described Idaho Power's supervisory system, and W. H. Blankmeyer told of a new radio alarm system installed by Montana Power Co. Noon said Puget Power had been successful in locating transmission line grounds, opens and shorts and also in locating faults in a long, deep submarine cable. The commercially made fault locator works on the radar principle.

Walker, Idaho Power, and Dwight, Westinghouse, described the comprehensive supervisory control program of Idaho Power. Power plants and substations within a 60-mile radius are included. No failure of supervisory has been experienced. So satisfactory has it been, said Walker, that all operating functions are now supervised at a great saving in manpower and with much less outage time. Blankmeyer told of an interesting application of radio alarm on one of Montana Power's natural gas pipe lines in which a coded signal is sent out by transmitters along the line in case of a break and picked up at a central receiver. He said this was done under a special FCC license for a coded signal of not more than one-minute duration. Anyone can get

A. R. Waehner demonstrating the proper application of series capacitors



such a license, he stated, and it should open up an entire new field of applications by utilities. His company will use small commercial sets in airplane patrol operating on such a type of license.

Utilization

Deliberations of the utilization committee under R. C. Setterstrom, chairman, covered flash welding, power factor correction, coordinating motor and lighting voltage and telecasting. Mayer, Idaho Power, said that experience with flash welding on several systems indicates no particular trouble. A general discussion on power factor correction on customers' premises brought out a few cases of trouble with high voltage on starting coils and a case or so of feed-back into the utility system. O. B. Falls, General Electric Co., said that, generally speaking, it was more economical for the utility to supply the correction and charge the customer for kilovars. The subject of coordinating motor and lighting voltages was left up in the air, but most seemed to feel that present motor and apparatus voltage ratings should be retained rather than to try to have a new motor rating to cover both the 208- and 240-volt services supplied by the utilities. A discussion of television from the power company interference angle brought out the fact that in neither Seattle nor Salt Lake has the utility had to shoulder more than 10% of the blame for TV interference. Utilities and dealers must work together on the problem, stated Walker, Puget Sound.

T and D

Several important subjects were discussed in the session on transmission and distribution under C. H. Kirk, chairman. Although statistically Portland General Electric is due to lose only 35 linemen in 20 years, actually it already has lost 13 in the first three months of this year. In 26 months the company made 24 apprentices into linemen, but this is still too slow a rate. The situation calls for an accelerated training program under which there will be set up a formal program to turn out journeymen linemen in one year. Waterman, Idaho Power, said that use of new and very much improved slow-acting fuses will permit closer protection of distribution transformers and that, by careful study to match fuse characteristics to oil circuit breaker operation, it will be possible to obtain coordination over longer lines by individual sections.

Glen George, Washington Water Power, reported good success with weed and brush control by use of chemicals around substations, but only varying degrees of success with fire protection on transmission lines. This is due to terrain, type of vegetation and climatic conditions and the care of application used. Recent tests with No-Flame, a chemical spray, have shown promising results.

Proper application of series capacitors on distribution lines was discussed by A. R. Wachner, Line Material Co., Milwaukee. Application of series capacitors requires constant vigilance; cost is high, but voltage regulation on low power factor constant loads is instantaneous and automatic, he said. Shevalier, Montana Power, presented an analysis of costs and advantages of series and multiple street lighting systems. His company uses all, but favors the 6.6-amp. series system because of lower line loss and longer lamp life. Hogg, Idaho Power, discussed street lighting standards developed by his company to hold costs to the 1939 level so that street lighting rates would not have to be increased.

The power production committee, J. D. Ellis, chairman, presented several subjects and speakers. The new Orem steam plant was described by Adams, Utah Power & Light Co.; L. B. Cowgill, reviewed 1948-49 operations of the Northwest Power Pool, predicting an energy shortage next winter under below-normal water conditions; G. P. Ellis, Combustion Engineering Co., presented a color sound film depicting the rapid progress in steam plant design; Heikes, Idaho Power, reported on his company's new hydro plants, and Mortell, Puget Power, discussed fires in generators and their prevention.

House Heating

Under chairmanship of O. L. LeFever, the house heating research committee presented a lively session. Gordon, Portland General Electric, led discussion on the heat pump. Main points developed were: (1) the residential heat pump is in its infancy and many unknowns plague the designer; (2) high first cost is justified only by pride of ownership or need for summer cooling; (3) heat factors (kwh./degree day 1,000 cu. ft.) of the order of 0.10 to 0.20 have been attained as against heat factors of three to five times this for other systems; (4) of some 100 heat pumps in the Northwest, a great majority use well water as the heat source and, in the main, have proved more successful than units using earth as the heat source; (5) total investment (utility plus consumer) as developed by Boggs, Idaho Power, indicate that cost of the heat pump is about $125 per kw., or about half that for other systems.

Professor H. J. Dana, WSC, presented theoretical design data reported on p. 72 in this issue. Beckett, Wesix Electric Heater Co., described and demonstrated a new demand limiter switch developed by his company, and LeFever gave a general review of panel heating systems now in vogue.

A meeting of the code committee, under S. C. Alger, served to emphasize to the general membership and particularly to management the importance of giving code matters more serious attention. Retiring chairman of the engineering section, Lester R. Gamble, received praise from the resolutions committee and the general assembly for the capable manner in which he has conducted the engineering section during the past two years. John Bankus, chief engineer, Portland General Electric Co., succeeds Gamble as section chairman.

Includes Imperial

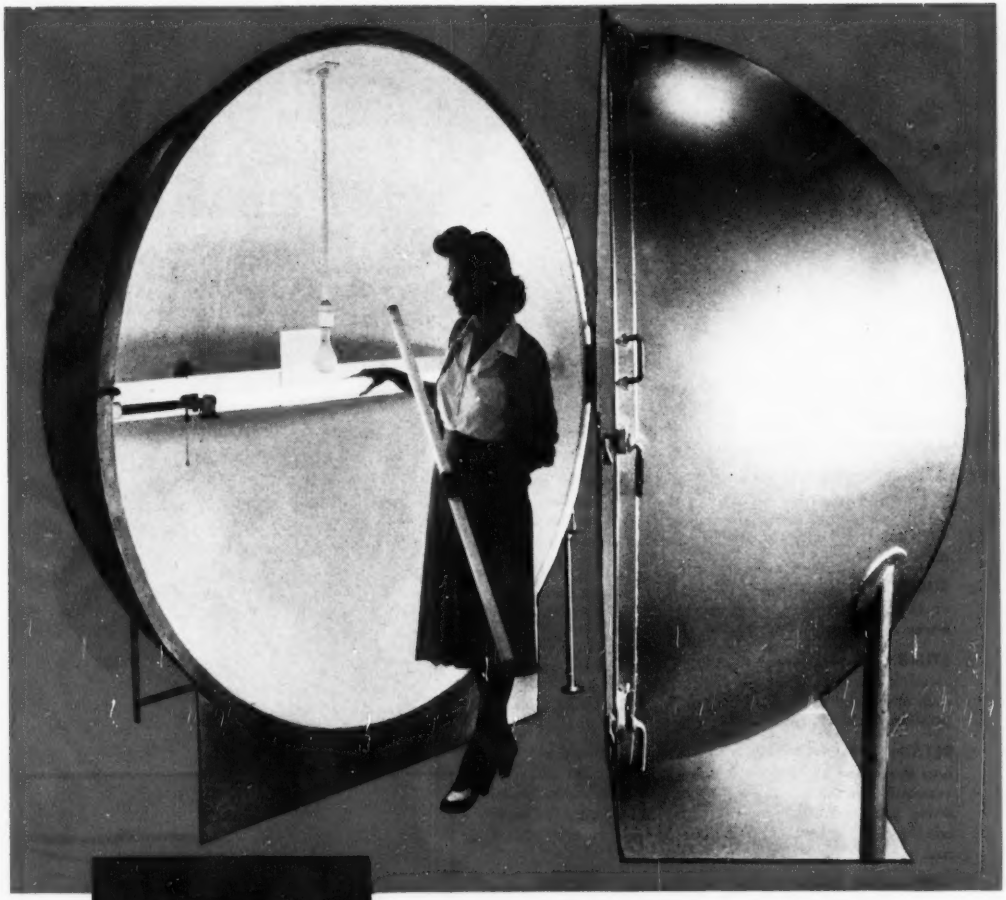
San Diego Chapter, NECA, has negotiated contracts with IBEW locals in Imperial Valley and is starting an Imperial Valley division or branch to handle contractors' affairs in that area. Pete Montgomery Jr., chapter manager, recently made such arrangements. The office of the San Diego Chapter has moved from 3554 University Ave. to Rooms 304-5, 3911 Fifth Ave., San Diego.

A state apprenticeship committee for electrical apprentices has been set up in California after a recent joint meeting of various local apprenticeship committees in Fresno. Richard Arbogast, Newbery Electric Corp., Los Angeles, was named chairman, and Fred Eggers, IBEW Local 595, Oakland, and editor of a textbook for apprentices, is secretary. The state committee is working on standards for admission to apprenticeship which will be uniform for the state.

NISA

In Portland the Oregon Chapter of National Industrial Service Assn. elected the following new officers for the year: August Verdurman, Skeen Electric Works, chairman; J. C. Reed, Reed Electric Co., vice-chairman, and Herbert Greenwell, L. A. Walker Electric Works, secretary-treasurer.

New officers of the San Diego Chapter, NISA, are Harold L. Arnhart, Arnhart Electric Works, chairman; Milton Emery, Diesel Electric Exchange, vice-chairman, and Frank W. Sloan, California Electric Works, secretary.



tests like this

To assure uniform brilliancy, a Westinghouse worker in the Fairmont, W. Va. plant gives "Easter egg" test to 100-watt fluorescent lamp. The brilliant radiation of this industrial lamp is measured through a tiny hole in sphere's side by an electric eye.

make Westinghouse Fluorescent Lamps

WORK SO WELL · BURN SO BRIGHT · LAST SO LONG

YOU CAN BE SURE...IF IT'S

Westinghouse

THE NAME YOU KNOW IN *Lamps*

Another contribution to better anchoring . . .

- **GREATER HOLDING AREA.** This new Chance Anchor has 8 blades that expand to form a square, with equalized load distribution all around the anchor. Each blade is required to carry only one eighth of the load.
- **GREATER HOLDING POWER.** The 8-way Anchor expands in the shape of a cone and holds like a wedge against undisturbed earth on all sides. The pulling force is exerted over a wide area building up compression against an inverted pyramid of earth.
- **SIMPLE CONSTRUCTION.** There are no moving parts, arms, or mechanical devices to hinder the smooth operation of the 8-way anchor.
- **STURDILY BUILT.** It is designed to expand easily without sacrificing strength. Hinges will not collapse under strain and each of the eight blades is formed with a reinforcing rib that prevents buckling.
- **RETAINS SHAPE UNDER HEAVY LOAD.** Repeated pull out tests show that the blades will not collapse or bend under an extremely heavy load. These tests show that the new Chance 8-way Anchor develops more holding power under the same conditions than other expanding anchors of comparable size.
- **EASY, SURE EXPANSION.** The new anchor is easily expanded because the pre-formed blades cut into solid earth with a minimum of disturbance and the pointed corner blades make starting easy. It requires from 3 to 9 less blows to expand. Linemen can easily tell when the anchor is fully expanded by the sound of the top plate hitting the bell-shaped blade stop.
- **BLADES ARE SUPPORTED BY BASE PLATE.** Blades are supported in the cone shape so that they will not buckle down in the middle. The diagram at right shows anchor in expanded position and illustrates how base plate supports blades.
- **NUT RETAINER AIDS INSTALLATION.** The Chance Nut Retainer, shown in diagram, makes it easy to push anchor to bottom of hole. The anchor rod and nut cannot be pulled through the base plate.

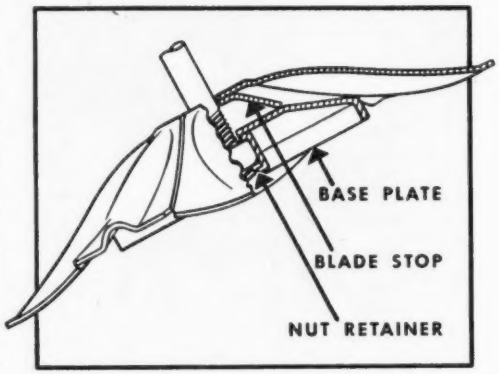


Diagram of Chance 8-way Anchor expanded, showing base plate, nut retainer, and blade stop.

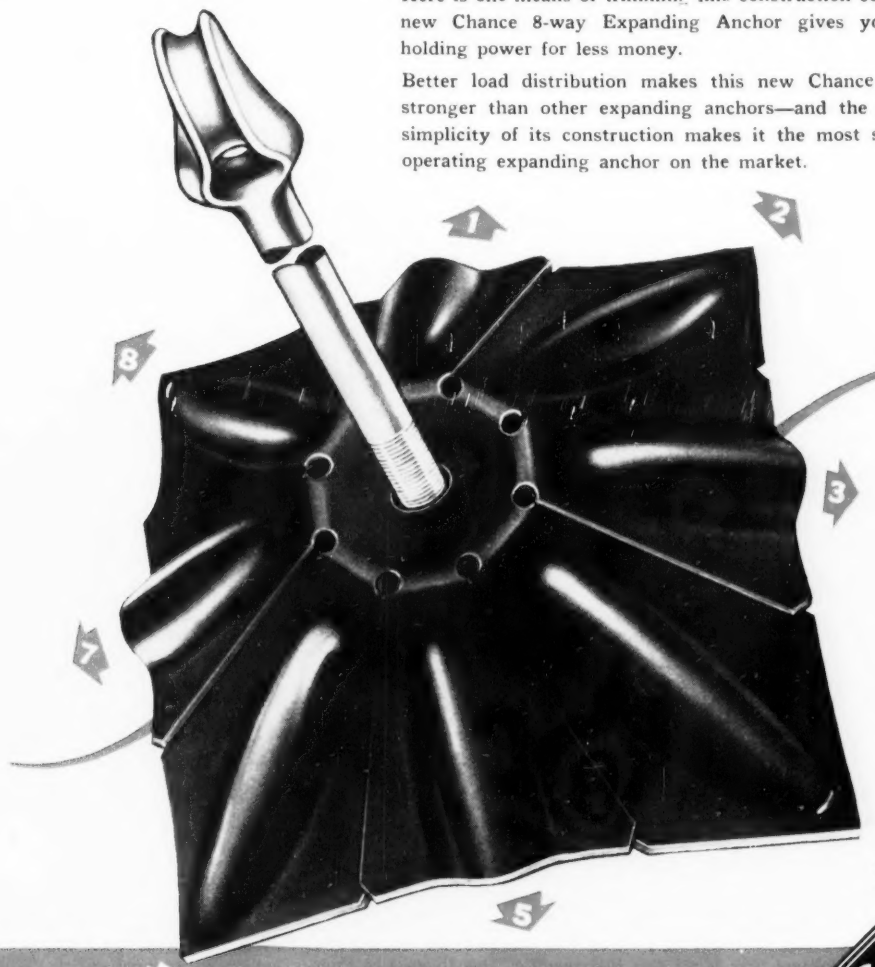
More than 13,000,000 Chance Anchors have been put in service!

A·B·CHANCE CO·

...New CHANCE 8-way Expanding Anchor

Here is one means of trimming line construction costs. The new Chance 8-way Expanding Anchor gives you more holding power for less money.

Better load distribution makes this new Chance Anchor stronger than other expanding anchors—and the absolute simplicity of its construction makes it the most smoothly operating expanding anchor on the market.



C4816

CENTRALIA, MO., SAN FRANCISCO, CAL.

ABC INDUSTRIES

Inspectors—IAEI

Customer-owned temporary service poles and equipment have long been a source of accidents, both electrical and mechanical. Rules of the Public Utility Commission regarding pole specifications and heights, and of the Division of Industrial Safety, regarding electrical equipment and grounding, have not jibed. Usually put up by construction contractors to obtain temporary power, these poles and equipment have violated both sets of rules and city inspection codes as well and there have been many serious accidents. The flimsy poles have fallen over, injuring either a climber or bystanders, ungrounded portable tools have broken down and given their users shocks that have sometimes been fatal, at others caused loss of control of a saw or tool so that it did serious damage; unlocked switches or open fuse blocks have been tampered with and caused hazards to children playing around construction sites. Art Veit, Los Angeles County electrical inspector, some years ago developed acceptable minimum standards for that county which ELECTRICAL WEST published and which have been used by many inspection departments.

Now the Public Utility Commission of California, working with utility company engineers, the Division of Industrial Safety and some inspectors, has worked out minimum standards for customer-owned service poles. These call for a 6x6-in. timber pole set 4 ft. in the ground and providing 16-ft. clearance for overhead conductors. Drawings of the standard, which has been approved by the commission for utilities in northern California, have been made. An article, with these drawings, will appear in an early issue.

Northern California Chapter, International Association of Electrical Inspectors, heard about these standards from F. E. Emerson, engineer for the commission, as one feature of its last meeting, held at Porter school, Alameda. Newly elected chairman Walter Keller, Santa Cruz inspector, presided. The other feature was an explanation, at luncheon, by O. G. Wedekind, Underwriters' Laboratories Inc., San Francisco, of the hazards that must be checked in testing television receivers. Looking as innocent as a radio set, television receivers utilize much higher milliampere currents that must be shielded and guarded from access by interlocks. The picture tube is apt to implode and throw a shower of glass, so Underwriters' standards call for safety glass in front of the tube of sufficient strength to withstand such an impact. Other hazards checked are insulations to withstand high voltages and corona, resistance of various parts to surges, possible X-ray generation. Wedekind also spoke of antenna and lead-in wire hazards to the set in lightning and advocated an arrestor and grounding of the antenna.

What happens when a television tube implodes explained by O. G. Wedekind

The chapter voted to invite the Central California Chapter and the Greater Central Valley Chapter to meet jointly with it at Santa Cruz, May 21, when Charles L. Smith, IAEI secretary-treasurer, Chicago, will be present.

Southern California Chapter also heard F. E. Emerson discuss the temporary pole standards and acting chairman, Charles Donahue, Orange County inspector, appointed a committee to study the recommendations and if possible adopt the standards for the entire state. Art Veit, Los Angeles County; Earl Ireland, Los Angeles city; E. E. Carlton, Division of Industrial Safety; Charles Donahue and H. W. Welton, Southern California Edison Co., were named.

Two other main topics at the meeting at San Gabriel, were the utilities' rules regarding height of meters and prohibiting mounting on bedroom walls, and the newly adopted standards for meter cabinets among utilities in southern California. H. W. Welton, Harry Bruce, Los Angeles Department of Water & Power, and C. N. Parker, California Electric Power Co., told of the complaints from customers having meters on bedroom walls, claiming they are kept awake by the hum in the meter coils. All declared that exceptional cases could be worked out by mutual conference.

Three manufacturers showed and explained samples of the new standard meter enclosures and assemblies of meters in multiples. Ray Blakeman of Blakeman Co., Don Harrend of Trumbull, and Charles Croft of Square D, explained the details of their respective makes which comply with the general standard that would replace the meter socket.

Utah Chapter, IAEI, finding that its proposed date for an annual state-wide meeting conflicted with the Northwest Electric Light & Power Assn. meeting in Salt Lake City, held its annual meeting on April 19 instead. Officers elected will be announced later. B. F. Brazier, architect, spoke on the "ABC's of AAA (Atomic Age Architecture)."

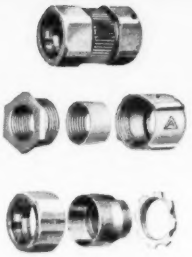
Puget Sound Chapter has its next quarterly meeting at Bellingham, Wash., on June 4.

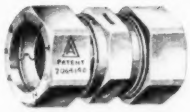
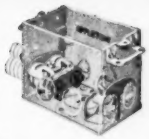
Newly formed Oregon Chapter plans to hold a meeting in Portland, May 13, at which Charles Smith, IAEI secretary, will present the charter.

Contractors—NECA

Three divisions of National Electrical Contractors Assn. hold conferences in May—the newly formed District 8, comprising the states of Colorado, Utah, Idaho, Montana and Wyoming, will hold its initial meeting at Denver, May 6-7, at the Shirley-Savoy Hotel; District 5, Arizona, Kansas, New Mexico, Oklahoma and Texas, at El Paso, May 10; District 6, California, Nevada, Oregon and Washington, changed its plans and will now meet at Oakland, May 22-23, at Hotel Leamington. Paul Geary, executive vice-president, NECA, is expected to address all conferences.

Most of the Denver program is scheduled for Saturday, May 7, at which Denver contractors will preside at the morning, afternoon and banquet sessions, J. E. Collier, Paul Jussel respectively. Reports of organization progress in Utah will be made by Jack Laub, Montana by Carl Faehr, Idaho by Joseph Gilgan and Wyoming by Charles Simpson. Si Halle, Colorado Springs, will speak for employers on apprentice training. Clyde Williams for the union. Wallace Wright, IBEW vice-president, will address the group in the afternoon on union relations. Arrangements are in charge of Don Larson, manager, Rocky Mountain Chapter, Denver.



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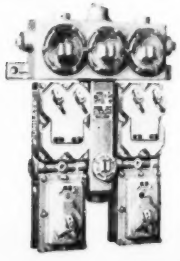

YOU CAN BE SURE.. IF IT'S
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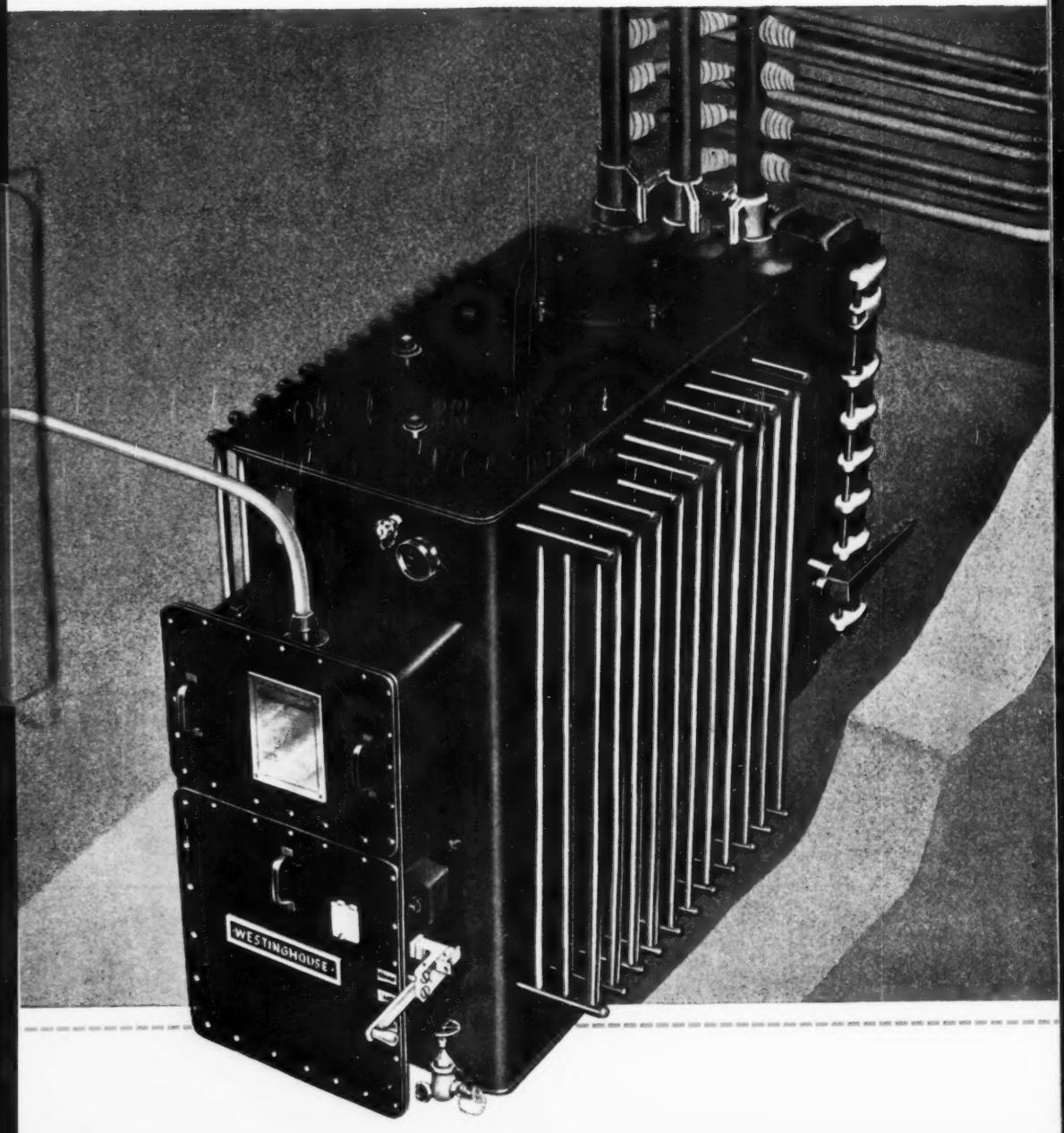

Now you can lower network costs with a Westinghouse STANDARD-TYPE transformer

New Features, New Ratings, New Service in Standardized Designs

The new Westinghouse Network Transformers are designed to make the use of standard units both practical and economical. Now you can eliminate individual engineering and meet your needs better than ever before.

The many "plus" features of Westinghouse standard-type, liquid-filled Network Transformers include:

Liberal Clearances between conductors to insure continuity of service;

Continuous Windings with sliverless copper;

Welded Cover providing Sealedaire dependability;

High-voltage Terminal Chamber with ample space for making cable connections in low vault;

Low-voltage Bushings that can be replaced without removing cover;

Undercoating of base to reduce maintenance and lengthen life.

In addition, you can stock standardized parts; delivery time is reduced to a minimum; and cost is less because the engineering has already been done. And now, two new standard ratings—150 and 225 kva—give you all the advantages in six liquid-filled units from 150 to 1,000 kva.

Westinghouse leadership, which developed network distribution and is constantly pioneering improvements, offers a sales and engineering service to assist you in applying the transformers for maximum service and economy both for enlarging established systems and in new applications.

Transformer engineers are always at your service via your nearest Westinghouse office. Write for B-4082 to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70528

THE SAFEST TRANSFORMER EVER BUILT!

Yet another step forward in network distribution is the new Westinghouse STANDARD SUBMERSIBLE DRY-TYPE Transformer. No liquids to leak, burn, explode, fume or require attention; built with Class H insulation; sealed nitrogen-tight by welding.

The Westinghouse Network Transformer line, to which this unit is the latest addition, also includes:

STANDARD VENTILATED DRY-TYPE units, for use where not subject to submersion;

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Westinghouse

NETWORK TRANSFORMERS

Made in the WEST . . for the WEST

E. R. Cornish, director, Western office of NECA, San Francisco, announced a change in plans for the District 6 meeting, originally set for Spokane. Instead it will be held Sunday and Monday, May 22-23, at Hotel Leamington, Oakland, with a banquet on Sunday evening, and a visit to the Radiation Laboratory and Cyclatron at University of California after the meeting, May 24. Program agenda had not yet been worked out but the scope of NECA activities was assured and an interchange of facts from all chapters relative to wage negotiations and demands for vacations with pay could be foreseen. J. B. Shamel, Los Angeles, District 6 vice-president, and Ed Buttner, Oakland, labor relations committeeman, will be prominent in the proceedings.

Northern California Chapter, storm center of last year's fight to keep vacations out of construction wage contracts, was again served with a notice by Locals 595 and 302 asking for vacations, but no wage increase. This came as the chapter's board of directors were struggling with an internal problem that resulted in the resignation of its manager, Ray V. Carey, appointment of his assistant, Ernest Kramm as manager temporarily, a tightening of the belt financially all around because of the loss of the San Joaquin Valley group to form a chapter of its own, the request from the Contra Costa branch for a chapter of its own and an implication that the Monterey Bay and Santa Clara County area contractors might seek to make a chapter also.

In resigning Carey told the board the fight last year had undermined his health, and conflict of groups in the chapter undermined the ability of the manager to face another battle of the same magnitude. Since the first of the year he had been by-passed in financial and policy affairs, he said, by groups working at cross purposes. Kramm was asked to stay and operate within the reduced budget.

Not for nothing was Kramm named Ernest, for with earnestness he began a heavy program to pull the chapter together. Meetings were held in all areas to discuss labor negotiations and other matters. First of a series of estimating classes, held at Laney Trade & Technical Institute, Oakland, was attended by 70 contractors and estimators. E. R. "Al" Cornish, NECA Western director, conducted the class. Walter Smithen of the Electrical Estimators Assn. acts as co-instructor.

Southern California Chapter, NECA, was recently served notice by the unions in the area that they would demand a $3 per hour journeyman's rate, vacations with pay, a hospitalization plan, parking space and shorter working hours.

New officers of No. California Chapter, NECA, Ernest Kramm, manager, and Cecil Searle, Santa Cruz, president

San Francisco Electrical Contractors Assn. sponsored an exhibit of Uskon radiant heating April 7-8, in cooperation with the U. S. Rubber Co., in San Francisco, at Marine Memorial Club. Frederick P. Combier, manager of Uskon sales, New York City, pointed the profit possibilities to contractors in becoming salesmen and installers both for radiant heating panels. Combier also addressed contractor groups in Fresno April 12, Sacramento April 19-20, Portland April 14-15, Seattle April 18, Los Angeles April 23-May 1, and will appear in San Diego May 2-3 and Phoenix May 5-6. El Paso May 10 at a District 5 NECA conference.

Line Constructors Meet

To seek ways in which they could be put in a position to do some of the power line and substation work that, because of more favorable labor rates, is going to general contractors and others not under contract to use higher scaled IBEW labor, 30 or more electrical contractors met in San Francisco, April 2-3, to talk the matter over themselves and with officers of International Brotherhood of Electrical Workers, E. R. Cornish, director, National Electrical Contractors Assn. Pacific Coast office, called the meeting, and E. L. Buttner, Scott-Buttner Electric Co., Oakland, District 5 labor relations committeeman, presided. Walter H. Kanzler, chief of design, and L. C. Stewart, procurement officer, of Bonneville Power Administration sat in as interested parties.

Oscar G. Harbak, IBEW vice-president, had with him on the first day his assistant, Otto Riemann, and 13 representatives and local union managers from San Diego, Los Angeles, Las Vegas, Fresno, Oakland, San Francisco, Medford, Portland and Seattle. Expressions from this group were sympathetic but no commitments were made to help contractors having union agreements to be placed in a more competitive position labor-wise with general and other contractors.

Conditions in the Northwest, where an area-wide agreement on line construction has been established, were so much better for electrical contractors that steps were taken to form a California-Nevada line constructors chapter of NECA and to negotiate an area-wide agreement with IBEW. Gerald Petersen, Petersen Engineering Co., San Francisco, was made chairman of an organization committee, Cornish its temporary secretary to bring such a chapter into being. The Northwest Line Constructors chapter has as its president, James C. Roberts of Spokane; R. B. Lane, Industrial Electric Co., Seattle, is its governor and Paul Heydon, Spokane chapter manager, is its manager.

At a meeting April 19, the California-Nevada chapter was set up and Gerald Petersen named president; N. Andersen, Drury Electric Co., Bakersfield, governor; R. D. Schurr, Schurr & Finley, Los Angeles, vice-president; Carl Severin, San Francisco, treasurer, and Cornish will act as manager.

IES

Myrtle Fahsbender, director of residential lighting, Westinghouse Lamp Division, has been programmed on several meetings of IES and Electric Clubs on the West Coast. Early in April she spoke on functional lighting for the home at a joint meeting of the Portland Electric Club with the Oregon Section, IES. At an evening meeting of IES in Portland Miss Fahsbender amplified the story of home lighting for home economics teachers and PTA groups. In San Francisco the Electrical Living Institute sponsored Miss Fahsbender on a program devoted to a display and discussion of fixtures, adapter units and portable lamps, with the use of colored slides. She presented similar talks on residential lighting at the Mother Lode Chapter of IES in Sacramento, at a program arranged by the Lighting Fixtures Industry of Southern California and held jointly with the Southern California Section, IES, and in San Diego.

BAIE

Second annual Bay Area Industrial Exposition is scheduled for June 4-12 at the Oakland Civic Auditorium and Exposition Bldg. An estimated 200 industrial firms throughout northern California will have exhibits.

These FOUR FACTS ...add up to Closer Regulation at Lower Cost with Allis-Chalmers 5/8% Step DFR* Regulators!

*DFR — station type single phase regulator.
AFR — for 3 phase regulation.

FACT 1. **Maintain voltage within ± ¾ volt.** *Feather Touch Control* and *Voltage Integrator* make possible simpler, closer control . . . *Feather Touch Control* because it accurately follows line fluctuations without damping effect; *Voltage Integrator* because it sums up and balances out voltage fluctuations of short duration.

FACT 2. **Require only ⅓ the exciting current** of other types! Low exciting current of Allis-Chalmers regulators releases system capacity for useful loads . . . can be evaluated in savings up to 5% of purchase price. (Specific information available on this important point.)

FACT 3. **Up to 200% base current capacity** in as many as five intermediate steps with exclusive *Vari-Amp* feature. Simple 30-second adjustment adapts standard DFR regulator to increased load current of growing power demand (with corresponding adjustment in regulation range) . . . *without* need for by-passing or removing regulator from line.

FACT 4. **Proved low maintenance.** The *Quick-Break* tap changing mechanism and long-life contacts have withstood *hundreds of thousands* of tap changes under actual service conditions! These outstanding performance records are due to (1) the balanced spring action of the tap changing mechanism, (2) the small KVA interrupted with 5/8% steps, and (3) use of *Elkonite* RS-1045 contacts.

Many utilities have boosted load capacity of their feeders, increased revenue, and improved customer good will by closely controlling line voltages with Allis-Chalmers 5/8 % step regulators. Have your nearby A-C sales representative call and discuss these regulators in terms of *specific* advantages to *your* system. Or write for bulletins 01B6065A and 01B6056B.

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Originators of 5/8% Step Regulation

PANORAMA OF THE PCEA

Edited by A. X. Schilling

More About Convention

THIS year's convention promises to be different from those of recent years in several ways. For one thing, the gathering will hold its first meeting, a general session, in the afternoon, a time especially convenient for northern delegates. Then, too, the vacation-like environment and the three-day holiday following the convention are expected to attract an unusually large number of wives and daughters of delegates. The Hotel del Coronado, by the way, encourages combination convention-vacation plans by offering its special convention rates to delegates for several days before and after the convention.

Delegates will be welcomed during the first session, at 2:30 p.m. on Wednesday, May 25, by L. M. Klauber, president of the San Diego Gas & Electric Co. PCEA President M. G. Sues will deliver the annual president's address, following which talks will be given by Fischer S. Black, editor of *Electrical World*, and Ira H. Howell, commissioner, Public Utilities Commission of the state of California.

Section Meetings

During the morning of May 26, the Administrative Services Section will meet as a unit to hear: *What's Ahead for Business?* by Dr. Ray E. Untereiner, Caltech attorney-economist; *Rain and Colder*, by Harold Quinton, executive vice-president, Southern California Edison Co., and *What's It Worth?* by R. G. Kenyon, vice-president, Southern California Edison Co.

The section will meet in separate groups during the morning of May 26 to hear discussions of particular interest to each of these groups: accounting, credits and collections, personnel, and purchasing and stores.

The Business Development Section will meet as a unit during the morning of May 25 to hear: *Current Developments in Electric Radiant Heating*, by R. W. Shoemaker, consulting engineer; *LP Gas and Its Progress on the Pacific Coast*, by Charles B. MacGlashan, Shell Oil Co.; *Decentralization of Industry and the Area Economy*, by C. C. Jamison, Security-First National Bank, Los Angeles, and *Electronic Heating and Inspection Installations*, by Edmond S. Winlund, Allis-Chalmers Co.

The section will again meet as a unit during the morning of May 26 to hear: *Selling Techniques and Tools to Increase Freezer Sales*, by W. C. Conley, Coolerator Co.; *Of Course—It's Electric*, by James T. Coatsworth, Edison Electric Institute; *We Sold Electrical Living*, by Marguerite Fenner, PG and E; *Helping the Retailer Meet the Buyer's Market*, by Cyril C. Nigg, Bell Brand Foods, and *The Basic Principles of Good Salesmanship (?)* by a character who labels himself Professor Sylvester (Hokey Poke) Quarterwit.

The Operating Economics Group will meet in parallel sessions during the mornings of May 26 and 27 to discuss matters especially interesting to each of the following: communications committee; hydro-generation group; meter committee; safety committee; steam generation group; substation group; transmission and distribution group; and the transportation group.

For members of the steam group, a special field trip to the Silver Gate steam plant has been scheduled for the evening of Wednesday, May 25. Interested delegates will gather at the transportation desk in the convention hotel lobby, prepared to leave at 8 p.m.

The luncheon on May 26 will feature a talk by Dr. C. S. Benson, president of the Claremont Men's College, who will discuss *Education For Industry*, and the general session that afternoon will include: *Now is the Time*, by Ray W. Turnbull, commercial vice-president, General Electric Co.; *There is a Tide—*, by Dr. Ray E. Untereiner, professor of economics and history, California Institute of Technology, and *How Best Can Workers' Purchasing Power be Increased*, by S. M. Johns, manager, Westinghouse Electric Corp., Salt Lake City.

The luncheon speaker on Friday, May 27, will be Fred B. Mitchell of the Fred B. Mitchell Co., San Diego. The general session that afternoon will include a talk by O. K. Coleman, consulting engineer, Edison Electric Institute, who will discuss *What Do You Want—Rules or Business?*; a dramatic presentation by the safety committee entitled *Who Killed Bill Evans?*; and a talk entitled *Television—Free Enterprise at Work*, by Lewis Allen Weiss, chairman of the board, Mutual Broadcasting System Inc.

Special Events

Golfers will meet in their annual competition for the Byllesby Cup, Pelton Cup, Addison B. Day Cup and other worthwhile prizes at 8 a.m. on Saturday, May 28, at the San Diego Country Club in Chula Vista.

The Early Bird Club will operate again this year, with prizes going to those who are prompt in attending the sessions.

The manufacturers, manufacturer's agents, wholesalers and distributors will be hosts at a cocktail party Friday evening, May 27, and the annual banquet and dance will immediately follow it. Dress will be formal for ladies and optional for gentlemen.

Of special interest is the trip to Tijuana planned for Thursday evening. Delegates and their ladies will be taken to the Fronton Club in the Mexican city for dinner and then to the Jai Alai game, said to be the fastest game in the world. Tickets for the trip, including the bus fare both ways, dinner, and admission to the game, will be $5 each and may be obtained at the transportation desk in the convention hotel lobby.

Special programs for the ladies will be available at the registration desk and will offer such attractions as an informal tea at 4 p.m. on May 25; a cruise on San Diego Bay on the morning of May 26, with a box luncheon served on board; a luncheon at the Hotel del Coronado pool at noon on May 27, and bridge games.

A special train will be operated by the Santa Fe, leaving the Los Angeles Union Station at 9:30 a.m., May 25, and connecting at San Diego about 12:45 noon with special buses to take delegates directly to the Hotel del Coronado to arrive in time for the opening general session.

Torque Wrench Tests Prove
KEARNEY Con-Nec-Tites *Tougher*

New Kearnalloy Metal
Gives You Highest "Re-usable Point" in History... *Plus* 80% Conductivity

Since 1926, when the first Con-Nec-Tite made of brass and testing 110 inch pounds was introduced, Kearney has continued to grade up the strength of Con-Nec-Tites. Progressing from brass, to bronze, to copper and finally to the present material, Kearnalloy, there has been an overall increase of 220 inch pounds of torque in the No. 6 size.

Being the first to introduce a product is only part of being a good supplier—modernizing and improving the original is the true test of the progressiveness of the manufacturer.

The new tough Kearnalloy now being used in the manufacture of Con-Nec-Tites gives you connectors that will take exceedingly high torques without damage and, because Kearnalloy is tough but not hard, you will not nick or otherwise damage your line conductors.

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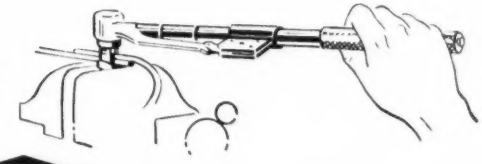
See for Yourself

Ask your Kearney representative to make the torque wrench test. He carries a torque wrench with him and is eager to prove the superiority of Kearney Con-Nec-Tites.



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Always Specify JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. *for the Job...*

Better Construction · *SAFER* Maintenance

THE MONTH IN BRIEF

Interruptible Power Restored

Interruptible power, cut off from Pacific Northwest industry by Bonneville last November when the power situation became tight, was restored April 14. Of the 82,000 kw. involved, 66,000 kw. went to the aluminum industry and 16,000 to other metallurgical plants. The aluminum industry estimated that the additional power would represent a gain of 5,000,000 lb. a month in aluminum production.

Municipal Purchase Voted

Newport, Wash., voters authorized a $350,000 bond issue to acquire properties of Mountain States Power Co. in and around the town. Legal contest may ensue, it is believed, since the Pend Oreille County PUD has a condemnation action pending for the same properties.

Radio Alarm Signal Licensed

An FCC license issued to Montana Power Co. permits operation of a radio alarm system with a period of transmission limited to one minute. In case of alarm at one of 15 transmitters, an identifying coded signal is sent to the single recording receiver. A small motor turns a disk which sends the coded signal and cuts it off after 60 seconds. Transmitters rated at one-half watt output will operate at 75.5 megacycles maximum of 15 miles with directional antennas. Signals will be amplitude modulated at 2,430 cycles to forestall interference with any future similar systems.

Referendum Possibility Lessened

Possibility of referendum procedure against the part of the recently enacted Washington state power bill that permits PUDs to group together to purchase private power systems was believed lessened by threat of PUD leaders to invoke similar action against the power commission authorized by the bill. If the referendum procedure is invoked, a vote of the people would be required at the general election next year; if no referendum is invoked, the measure becomes law on June 9. Meanwhile, the Washington state departments of public utilities and transportation have been merged into one department under a three-man public service commission, which includes Owen Clark, former director of transportation, and Raymond W. Clifford, former director of public utilities.

Reactor Tests In Future

No tests are likely at the new Idaho nuclear reactor testing station in the near future, according to Dr. Lawrence R. Hafstad, chief of AEC reactor development. The entire project hinges upon research and development at other Atomic Energy Commission facilities, which first must produce reactors to test. Eventually, several types of reactors, now in various stages of planning or development, are scheduled for trials at the Idaho site. Dr. Hafstad made it plain, however, that the tests are years, rather than months, in the future.

Earthquake Damage in Northwest

With the exception of Bonneville facilities, damage was negligible to electrical utilities in the Northwest from the earthquake April 13. Preliminary estimates indicate that damage to BPA equipment may run as high as $50,000. Major damage was at Longview, Wash., where three single-phase, 25,000-kva. transformers moved as much as 16 in., breaking three out of six 13-kva. bushings. Failure of the bushings did not cause loss of service, but all pot lines at the nearby Reynolds Metals Co. aluminum plant were shut down because of equipment damage. Bus structures were moved out of alignment and some duct runs were fractured and manholes caved in. BPA transformers and bus structures at Tacoma and Chehalis were moved appreciable distances.

Fishing Interests Oppose Dam

Creation of an interim committee to study the question of dams on the lower Columbia River and its tributaries was voted down by the Oregon state senate, 16 to 13. Passage of the proposal (supported by fishing interests) would have delayed for two years at least construction of the Pelton Dam (EWEST, February, page 138). Northwest Power Supply Co., corporation formed to build the dam, has asked Central Oregon PUD to waive its right to construct a plant a short distance upstream from the Pelton site. The PUD filed on the site in 1941, but has been inactive since. In consideration for relinquishment of its rights, the PUD has asked that contracts for disposal of the power from Pelton give priority to central Oregon. As this issue went to press, a possible new delay to construction of the dam was threat of court action by the Oregon State Fish Commission. The commission has invested $70,000 in a hatchery above the dam site and maintains there is no place below the site that a hatchery could be built to replace it.

Space Heating Ban Asked

A ban on new or additional electric space heating installations and connections of industrial loads of 500 kw. or more until expiration of the "present emergency with respect to the deficiency of electric power" has been recommended for the Pacific Northwest by the Utilities Conference Committee. According to an announcement by Committee Chairman C. A. Erdahl of Tacoma, there probably will be a deficiency of electric power in the area periodically over the next several years, necessitating curtailment and other conservation measures, and the public interest will be served best by making provision for existing loads by curtailing new or additional power uses. Most power companies in the area already have banned the additional use of electricity for space heating and have granted power to new industries only on an interruptible basis.

Last Unit In At Shasta

Shasta Dam's fifth 75,000-kw. generator went on the line April 28, bringing output up to name-plate capacity of 375,000 kw. Formal dedication of the dam is expected in the fall.

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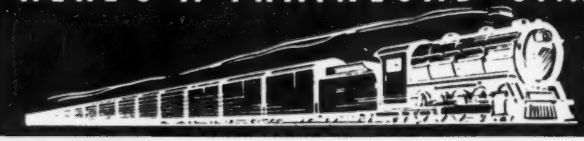
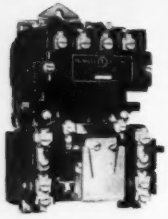
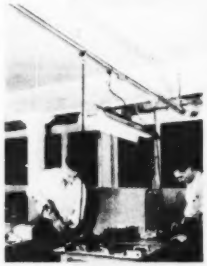




MAGNETIC MOTOR STARTERS

For complete protection of all AC motors up to 50 HP, the Trumbull Type GM full voltage magnetic starters in NEMA sizes 0, 1, 2, 3 feature new contacts, arc hood, magnet armature and the outstanding plastic encased coil. Inspect each detail of this carefully tested device and see how Trumbull starters are made for extra-long life, faster installation, and easy maintenance.

LTG FLEX-A-POWER

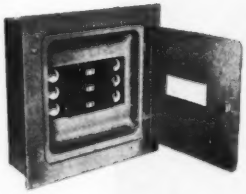


LTG is a 50 ampere plug-in or trolley busway which supplies power for fluorescent lights and power tools. An extension of Trumbull Flex-A-Power, 2, 3 or 4 pole combinations are available in one compact housing. Run this system through your plant and you have a continuous outlet or mobile power take-off. Flexible and convenient, this equipment is suitable for industrial plants, offices, garages, stores, arenas and work shops.

RESIDENCE PANELS

Here is a style of residence panelboard that can be brought up out of the cellar to a convenient, close-at-hand location in the kitchen or hallway. You have fuse protection for 2, 4, 6, 8, 10 or 12 lighting circuits in an enclosed, safe, flush or surface installation. Extent of line: 125-250 V. AC; 2 or 3 wire mains and 2 wire branches. Approved by Underwriters' Laboratories Incorporated as an Enclosed Branch Circuit Cut-out.

NTPR & NTPS PANELBOARDS



NTPS and NTPR are standard switch and fuse type lighting distribution panelboards available in 6 to 42 circuits for modern factories, office buildings, hospitals, residences and similar structures. NTPS and NTPR 6 circuit types can be used as Service Entrance equipment in stores, garages and residences. Each panel is made up of the new Trumbull six circuit section which has plug fuse and toggle for 6 branch circuits. NTPS 6 shown.

FUSE PULLER

For main, range and lighting circuit protection, with terminals for water heater connection, the Trumbull streamlined fuse-puller switch provides convenient, long-life service. Available for flush or surface mounting with 60 or 100 amp. capacity fuse pullers, this new device has plenty of knockouts, abundant clear channel wiring room, and a neutral that is easy to wire. A dead-front shield protects user from open wiring and keeps interior dust-free.

Trumbull products are among the many famous name brands carried by General Electric Supply Corporation, assuring you the best materials obtainable.

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The Election of November 2, 1948 GAVE NO MANDATE FOR SOCIALISM

The President and those who support his legislative program have objected to the substance of my previous editorial, which appeared under this headline: "Now is the Time to FIGHT SOCIALISM in Washington."

In that editorial I explained how Washington is poised to follow the disastrous policy of forcing industry to skimp on new plants and new equipment. That policy landed Britain in the numbing embrace of the Socialists. I cited the experience of Britain to show how such skimping on industrial tools can bring a nation to economic stagnation . . . and Socialism.

The President, in his recent Jackson Day speech, brushed aside this warning . . . "They are again trying to frighten the people with the old worn-out bugaboo that Socialism is taking over in Washington." Senator Francis J. Myers of Pennsylvania asserted that I was guilty of "warfare against any reasonable effort to keep our system of free enterprise working."

These criticisms may be sincere. But they are not well-founded.

I want to show why they are not well-founded by basing this editorial on Washington rather than Britain.

In Washington the Administration has proposed a legislative program, the key parts of which would clearly put the country far on the road to Socialism. Let us see how.

There are two steps in the process:

FIRST: The government by its taxation program undermines private industry so that it cannot provide itself with the necessary new plant and tools.

SECOND: The government itself steps in to provide the plants and equipment that it has blocked industry from getting. *That is Socialism.*

Here is how Washington is promoting Socialization of the steel industry—and of other industries.

Steel has been expanding its capacity and improving its equipment chiefly by plowing back its profits. During the last three years it has spent $1.4 billion for new plants and new tools. That was more than the companies had available from their own earnings. But profits provided more

continued on next page

than half of that money—more than $700 million. The remainder came from loans and from depreciation reserves set aside out of the earnings to replace worn-out equipment.

Profits must continue to provide the funds needed to pay for the bulk of the steel industry's necessary expansion. That is because private citizens, their income slashed by heavy taxes, have not been willing to buy steel stocks even at prices ruinously low for the companies and their present stockholders. The stock market currently prices the mills and other facilities of the nation's principal steel-producing companies at far less than fifty percent of the cost of reproducing them.

Let us take another example. Profits are essential to expansion in the electric light and power industry also. This year private companies are planning to buy $2 billion worth of new plant and equipment. To do that without going overboard in debt, they must sell to the public some $300 million worth of common stock. A squeeze on their profits would make that sale virtually impossible.

For tens of thousands of small business enterprises profits afford virtually the only practical source of funds for new equipment and expansion.

In the face of these and many other examples that might be cited, what is the most effective way to prevent industry from re-equipping itself and expanding is capacity to meet our essential needs?

Obviously, it is to cut down profits. And that is what the Administration is trying to do. The President has declared that steel prices are too high, and is demanding that Congress raise taxes sharply on all corporations.

There you have the first step toward socializing industry.

Next comes step two. Have the government supply the tools and equipment which, by taxation, it prevents industry from getting.

The Administration has proposed legislation to carry out this second step. It is called the "Economic Stability Act of 1949," for short, the "Spence Bill."

This bill gives the President the power to provide industrial facilities—in steel, power or any other industry—where he finds that a shortage is hampering or is likely to hamper the economy.

True, the bill says that the government is not to construct new plants if private companies will do it through government loans, on terms prescribed by the President. That may be just one step short of complete socialization. But it is only a short step. And the Spence Bill authorizes the government to take that step.

By itself, the Administration's "Stability Act" sounds harmless enough. It would have the government build plants only as a last resort. But it provides also that if private enterprise cannot turn out all the goods the country needs, the government can and should step in and provide the equipment to do it.

Now, take that power together with an Administration tax program that undercuts the ability of private enterprise to supply the new plants and equipment it needs out of its own earnings. That combination promotes government ownership and operation of industry.

And that is Socialism.

The American people, of course, have the right to live under any system they choose—Capitalism, Socialism, Fascism, Communism, or what-have-you. But before Socialism or any other "ism" is imposed upon us from above, the people should know the facts. If this editorial shall have contributed in some small degree to that end it will have served its purpose.

The election of November 2, 1948 gave no mandate for Socialism.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

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Anaconda's Duraline URC Weatherproof gives vastly improved performance during emergency periods.

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THIS MONTH'S NEWS

ESTIMATE GIVEN ON PUGET POWER PROPERTIES

First valuation estimates of properties that might figure in a sale by Puget Power & Light Co. to the city of Seattle have been given by President Frank McLaughlin. These figures place a reproduction cost new of $44,339,404 on electric properties, not including generating facilities, in the Seattle competitive area, as compared with $43,227,478 recommended by city appraisers. On a reproduction cost new less accrued depreciation basis, the company fixes a valuation of $36,388,957 as compared with the city appraisal of $23,767,324.

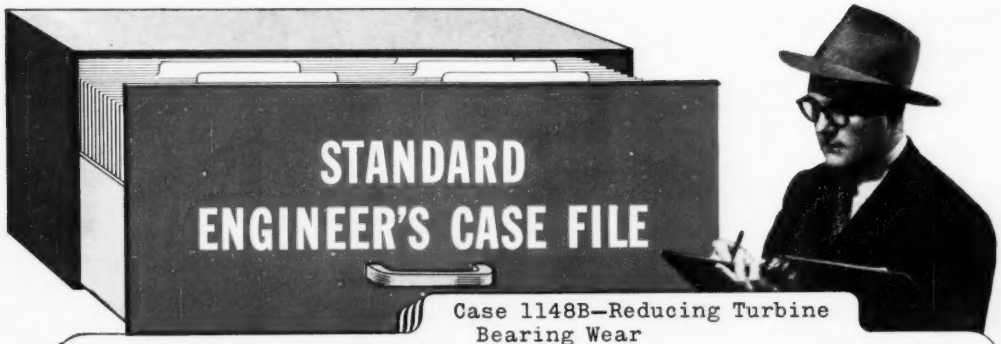
McLaughlin attacked the depreciation estimates of city engineers as excessively high and of reproduction cost less depreciation as unjustifiably low. Total estimate of depreciation by city engineers is $19,460,154, or 45% of reproduction cost new; the company's estimate is $7,950,447, or 18% of reproduction cost.

Meanwhile the Seattle city council has authorized employment of J. W. Peterman as expert adviser in purchase negotiations. The city of Tacoma has filed condemnation action against company properties in Pierce County Superior Court, seeking to acquire the White River and Electron hydro plants, transmission lines and distribution facilities in the Tacoma area. Tacoma claims to have prior right to proceedings by Kitsap and Thurston county PUDs for the properties.

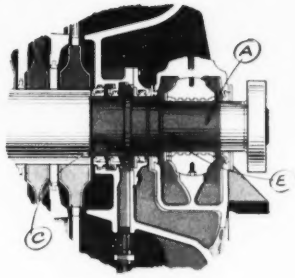
Suggestion that the recently authorized Washington State Power Commission acquire company generating facilities and supply the PUDs and cities of Seattle and Tacoma was not being given immediate consideration.

Idaho Power Files for Snake Hydro Permit

Idaho Power Co. has filed for a 36-month preliminary permit for a hydroelectric project on the Snake River in southwestern Idaho. The proposed development would be located in Ada, Canyon and Owyhee counties; would consist of a reinforced concrete and earth-filled dam which would back up water approximately 12 miles and form a storage pond with an area of approximately 950 acres; a power house with three 13,500-hp. units.



Case 1148B—Reducing Turbine Bearing Wear



TURBINE BEARING

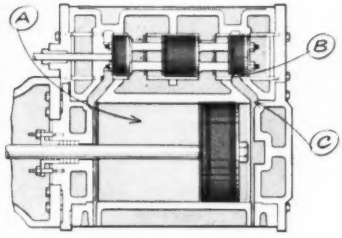
There was no sign of acidity or deterioration in Calol OC Turbine Oil when, after six years use in a heavily-loaded turbine, a sample was given a laboratory analysis. Bearings and other parts showed practically no wear and the entire lubrication system was clean and functioning with maximum efficiency. Recommended for all steam turbine lubrication and as the medium in hydraulic units. Comes in four grades: 9, 11, 15, 19.

A. Has excellent metal-wetting ability — resists the heaviest bearing and gear loads and assures constant lubrication.

B. Contains a highly effective oxidation inhibitor — prevents the formation of lacquer, gum, and sludge deposits on parts and in oil and hydraulic systems.

C. Corrosion inhibitor stops rusting — Calol OC Turbine Oil in both salt and fresh water tests kept steel strips from rusting while they were immersed in the water-oil mixtures for 48 hours.

Case 1140—Meeting All Steam Engine Lubrication Conditions



STEAM ENGINE CYLINDER AND VALVE

In a group of steam engines of various types, Calol Cylinder Oils provided maximum lubrication efficiency in each one. The long list in this line includes oils with the special combination of properties to meet all different conditions of steam engine pressure, temperature and moisture. In addition, each has several general attributes that assure economical operation.

A. Good adhesion to surfaces reduces wear, prevents dry spots, scoring, and minimizes corrosion.

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ENGINEERS, USBR AGREE ON COLUMBIA CONSTRUCTION

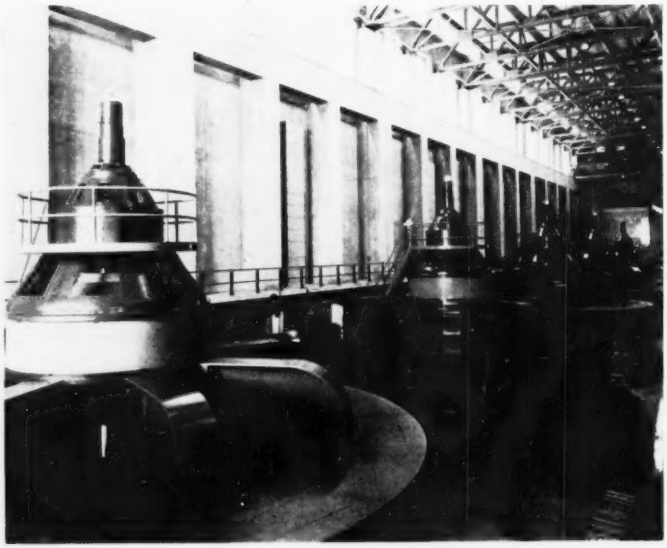
Army Engineers and USBR finally have settled their differences over construction in the Columbia River basin. The agreement has been in the making since last summer, when President Truman asked the two agencies to coordinate construction plans.

Announcement of the full agreement last month had significant timing. Army and Interior sent the accord to President Truman on April 11. On April 13, the President, in a special message to Congress, asked for establishment of a Columbia Valley Administration. CVA legislation was introduced in the House on April 14 and Interior Secretary Krug endorsed the CVA proposal the same day. Not until April 19 was the Engineers-Reclamation Bureau agreement announced by the White House.

A principal policy decision in the agreement calls for the pooling of power revenues from Army and Reclamation projects in the basin to support irrigation works. The agencies also agreed to interconnect the hydro projects with "necessary" transmission facilities.

The controversial Hell's Canyon project, proposed for the Snake River, would be built by the USBR under the agreement. Previously both agencies had claimed it.

The accord also narrowed chances for further conflict over such projects by dividing streams of the area for future investigations. Under this arrangement, the Engineers would restrict future activities to the following zones: Columbia River main stream below Grand Coulee; main stream of the Snake below the mouth of the Grand Ronde River; the Kooskia project; the entire Willamette River basin; the Kootenai basin; the Spokane River basin; the Pend Oreille basin below and including Pend Oreille Lake. USBR would have primary responsibility for development on upstream sections of the river, above the Army's area of jurisdiction. It also would develop most of the lesser tributaries of the Columbia and the Snake.



Shasta's fifth 75,000-kw. generator went on the line on April 28, bringing output to name-plate capacity of 375,000 kw. Formal dedication of the dam and power house is expected in the fall. All five machines can be seen in this photo

New Power Source Ketchikan to Study

The Ketchikan, Alaska, Public Utilities Board has authorized Manager John M. Weir to develop plans for an improved or additional pipeline at the Beaver Falls hydro plant. Steadily increasing consumption indicates that the city will require a new source of power in about two years, it is stated.

The present pipeline is unsatisfactory because of two large sections of trestle and two raises where pressure is lost. Tunnels are being considered to eliminate the trestles and utilize the full head of water available. A new pipeline would involve a new generator.

Capable of producing 1,250,000 kw. a month, the plant developed 1,125,000 kw. in February, Weir reported. This enabled the system's Ketchikan plant to decrease its output below the 814,000 kw. produced in January and save water in the two Ketchikan lakes.

Because of the Beaver Falls operation, the system was able to operate throughout the winter with no reduction in voltage.

● FPC has granted a license to Montana Power Co. for its existing Thompson Falls hydro plant on the Clark Fork of the Columbia in northwestern Montana. The license is effective as of Jan. 1, 1933 and will terminate June 30, 1970. Montana Power filed application in 1942 following an FPC investigation of the status of lands occupied by the development.

● FPC has authorized an 18-month preliminary permit to Snohomish PUD No. 1 for a proposed hydro development on the Sultan River in northwestern Washington. The development would consist of a concrete dam with a maximum height of 310 ft., creating a reservoir with 234,300 acre-ft. storage capacity; a 5.2-mile tunnel and a 60,000-kw. power plant.

California Oregon Power To Add Hydro Capacity

Completion of its five-year construction program in 1953 will add 145,000 kw. of hydroelectric power to the generating capacity of the California Oregon Power Co., and will virtually double present production, according to A. S. Cummins, company president.

The company plans to build eight separate plants on the North Umpqua River in western Oregon, all in the same license area. The program also will provide extensive additions and improvements to transmission and distribution facilities. Over-all cost may reach $50 million, it is estimated.

Partial completion of the company's Toketee Falls plant this year will add approximately 27,000 kw. which will be taken into the system network via the Roseburg load center. The first two units of the plant will be put in operation next fall.

● El Dorado And Placer counties in California have applied to FPC for an 18-month preliminary permit for hydro plants in the Folsom Dam area on the American River. Proposed are a generating plant to utilize water power of Folsom Dam and reservoir, and a second power plant at the proposed after bay dam below the main Folsom Dam. Pacific Gas and Electric and Sacramento MUD filed previously for similar projects at Folsom.

Which panelboard is right for your lighting?

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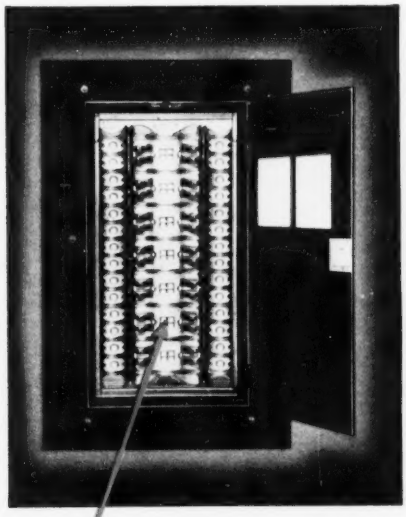
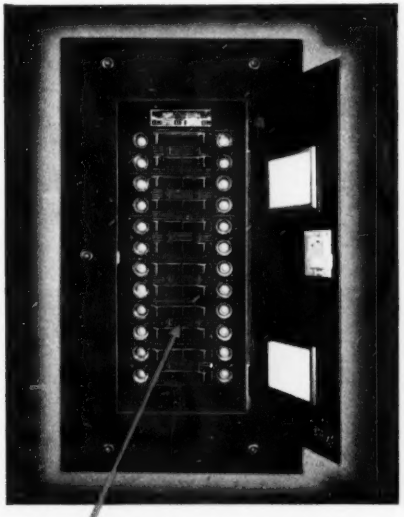


Cutaway view of standard SUPERBA unit, featuring OMNI-bus bars, rugged toggle switches—all contributing to the utility and appearance of the SUPERBA Lighting Panelboard line.



Close-up of ROCKER-TYPE unit, designed for durability, maximum dielectric strength, and high resistance to heat—plus a simplified switch mechanism with durable rocker handles.

Specify BullDog Superba Lighting Panelboards

BullDog SUPERBA Panelboards are designed for use in offices, commercial stores, and other applications where appearance is as important as performance.

Standard SUPERBA features individual fuse doors interlocked with switch handles for extra safety. Circuits must be "dead" before fuses are accessible.

Modified SUPERBA is identical to *Standard*, except for the individual interlocked fuse doors. It is recommended for installations where servicing is normally done by an electrician.

Both SUPERBA Panelboards have the exclusive OMNI-bus feature, which permits easy balancing of loads. Heavy-duty toggle switches, with quick-make and quick-break action, minimize danger from arcing and burning.

In cartridge-type units, there are built-in fuse ejectors for safety and convenience.

BullDog Field Engineers welcome the opportunity to sit in with you during the early planning stages of a building project. Their knowledge of electrical distribution layout can mean savings in installation costs, as well as efficiency and reliability in actual operation. Why not take advantage of this service?

Specify BullDog Rocker-Type Panelboards

BullDog ROCKER-TYPE Panelboards are designed for heavy-duty factory lighting circuits, where dependable performance counts. They are safe, efficient, and simple to maintain.

ROCKER-TYPE boards have branch circuits of molded material, are arc-resisting, non-carbonizing, and non-tracking.

Design of switch mechanism permits frictionless snap action. Smooth-working, knife-edge bearings need no lubrication. Rugged rocker handles outlast all others.

For a durable, dependable, heavy-duty lighting panelboard, specify BullDog ROCKER-TYPE.

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San Francisco 3, Calif.

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street Tel. Logan 5-5331
Los Angeles 11, Calif.

PUD APPLIES FOR HYDRO SITES

Skagit County PUD of Mt. Vernon, Wash., has applied for hydro sites on Illabot Creek, near Concrete and on Deer Creek-Cavanaugh Lake, near Mt. Vernon.

The 14,000-kv. Illabot Creek plant would be in operation within three years or so; a 50,000-kw. Deer Creek plant is under consideration for later development.

The PUD plans to obtain 10,000 kw. of secondary power from Bonneville. A 10,000-kw. steam plant at Anacortes is projected to provide power when the Bonneville supply is unavailable. Construction of the one hydro plant and the steam plant would be financed by a $10,000,000 bond issue.

● IDAHO Power Co. has FPC authorization to issue up to $4,000,000 in common stock, $1,000,000 in 4% preferred and short-term bank notes aggregating $4,000,000 in excess of statutory exemption, which is 5% of the company's total capitalization.

Economical operation is assured by building the core and coils of every Gardner transformer to yield best results in the type of service for which it is intended. Design provides either highest rated load efficiency or highest all-day efficiency, depending on whether the transformer is for power or for distribution service. The maximum energy efficiency point is placed where it pays off in lowest actual operating losses — highest average utilization of power.

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GARDNER TRANSFORMERS GUARD PROFITS

NEW RUNWAY LIGHTS PLANNED AT LOS ANGELES

Plans for high-intensity runway lighting at the Los Angeles Airport have been approved by the Board of Airport Commissioners. Installation is expected to be completed by July 1, according to Col. Clarence M. Young, airport director.

This project will replace the present system with a series of about 60 illuminating units, shedding brighter and more direct beams to pinpoint the 6,000-ft. runway.

The high-intensity light, according to Colonel Young, will make the Los Angeles Airport the only commercial airfield in the world with all five landing facilities, including approach lighting system, instrument landing system, FIDO and GCA.

The new lighting project will include a color scheme to identify taxi turnoffs and other phases of the runway which soon will be lengthened to 10,000 ft. as part of the program.

California-Pacific To Build in Burns Area

California-Pacific Utilities Co. will start construction of a 69,000-volt transmission line in the Burns area of eastern Oregon. Cost of the 28-mile line and a new substation will be $170,000. The company has a $250,000 budget for extensions in Harney County during the year, which will provide funds for rebuilding distribution lines, including primary voltage changes from 2,400 to 7,200 volts. Since June 1946, electric loads in the Burns area have increased 30% and kilowatt-hour sales 112%.

● TUCSON Gas, Electric Light & Power Co., Tucson, Ariz., has received state corporation commission approval to finance a $4,226,000 expansion program. Planned are the construction of a larger power plant and expansion of existing facilities. The company spent more than $3,000,000 in developments last year, but still is behind demand.

● REVIEW of Pacific Power & Light Co. rates is asked by 42 Walla Walla, Wash., property owners in a petition filed with the state department of public works. The petition asks that the state fix a fair rate of return on the utility properties.

● MOUNTAIN STATES POWER Co. has been authorized by FPC to issue $2,000,000 in 3⅛%, 30-year first-mortgage bonds and 50,770 shares of no-par-value common stock at an initial public offering price of $31.75 a share.

Sangamo Watthour Meters

Good for Accuracy . . .

The modern oilless, noiseless, non-corrosive bearing system and rigid dovetailing of elements contribute to *sustained* accuracy. In actual customer service since 1940, a large group of J Meters in an 8-year test showed only five-hundredths of 1% change in accuracy from that at the time of installation!

Good for Revenue . . .

Overload compensation and other inherent overload characteristics will accurately measure *present* and *future* loads up to 400% of meter rating without loss of revenue.

Good for Economy . . .

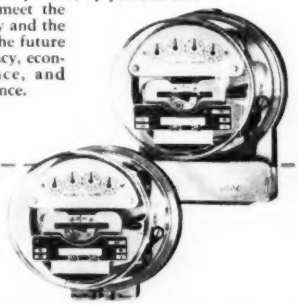
J Meters are built of corrosion-resistant materials and have full temperature compensation for cost-saving outdoor installations. All parts are easily accessible for inexpensive calibration, inspection, and replacements.

Good for Troublefree Service . . .

Sangamo J Meters have unusual freedom from electrical failure due to high insulation levels. Troublefree operation is inherent in the oilless bearing system. Millions of J Meters in use since 1940 have proved this fact.

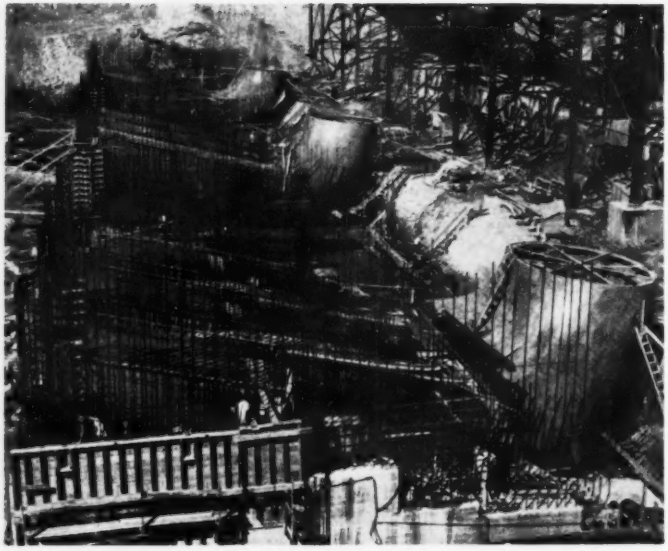
* * *

Sangamo J Meters have *proved*, by years of service, their ability to meet the requirements of today and the anticipated loads of the future with sustained accuracy, economy of maintenance, and troublefree performance.



50TH ANNIVERSARY SANGAMO 1899 - 1949

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS



Wooden forms for draft tubes take shape at Davis Dam power house. Here three of five tubes that will carry water from 45,000-kw. generators are nearly ready for concrete pouring. Completion is expected in the spring of 1950

City Crews To Handle Seattle Lighting Job

Seattle City Council has approved the recommendation of City Engineer R. W. Finke that installation of street lighting improvements, estimated to cost more than $3,000,000, be handled by city crews rather than under contract. Finke told the council that complications involved in letting the work out to contract were so great as to make that method impractical. Existing poles are used to a great extent and that means coordinating the work with other utilities, difficult under contract. W. S. Hill, electrical engineer, will head a unit in the engineering department that will supervise the project, which will extend over a three-year period. The city will save money by buying the material and doing the job itself, Finke said.

● USBR has closed the roadway on top Grand Coulee Dam to general travel. Bureau spokesmen said that use of the roadway by heavy construction vehicles and other equipment makes its travel by the public hazardous.

● In Its Fourth Report on the power market of the Missouri River Basin, FPC includes most of Montana, Yellowstone National Park and a small section of Idaho. Power requirements for 1970 in that area were estimated at 3.9 billion kilowatt-hours with a peak demand of approximately 640,000 kw., about double 1946 requirements. Approximately 296,000 kw. of new capacity will be needed by 1970, with 12,000 kw. additional required by 1950, the survey states. Copies of the report, entitled *Power Market Survey, Missouri River Basin Area, Montana, Part 1 — Power Requirements*, may be secured from the Publications Division, FPC, Washington 25, D. C., at $1 each.

● Completion of a new BPA line into Pacific County, Wash., is scheduled for Oct. 1. The project will cost approximately $600,000 and involves a connection with an existing Bonneville line at Holcomb on Willapa River. A 6,000-kva. substation will be built at Naselle and will connect with an 18-mile, 33,000-kv. line to be built into Ilwaco by Pacific County PUD.

● Grays Harbor PUD, Aberdeen, Wash., prevented a strike by a compromise wage and working agreement with Local 77, IBEW and with assistance of H. R. Conn, federal and conciliation service. A 3.4% wage increase, pension and vacation plan are included in agreement.

● American Public Power Assn. held its annual convention May 10-12 in Los Angeles.

PUD RETIREMENT FUND DECLARED ILLEGAL

A retirement plan for employees of the Clark County (Wash.) PUD has been abandoned as a result of a directive from J. R. Bowen, state examiner, who is auditing the district's books. The directive cited an opinion by the Washington state attorney general holding it illegal for public utility districts to contribute to retirement funds.

The retirement fund was established in February 1948, through an agreement between the PUD and the office workers and electrical workers unions. Under this agreement the PUD matched funds contributed by employees.

V. M. Cleaveland, PUD manager, said the $9,700 which the district has paid into the retirement fund would be transferred to the general revenue fund.

● A New Contract between Portland General Electric Co. and local 125, IBEW, provides for a general pay increase of 5.15%, plus an extra 5c an hour for certain groups of employees. The contract is for one year, retroactive to March 1. The 5c an hour extra is for linemen, wiremen and cable splicers. Under the contract, journeymen linemen's base pay will be $2.13 an hour, up 15c. Workers with 15 or more years continuous service with the company will get three instead of two weeks vacation with pay.

● After a four-day strike, maintenance and construction men of the Franklin and Benton County PUDs in southeast Washington returned to work when linemen were granted an increase of 18c an hour to $2.18. The PUDs previously had offered $2.13. The strike affected about 75 workers, according to Owen Hurd, Benton PUD manager, but did not affect normal electrical service. The workers are represented by the International Brotherhood of Electrical Workers.

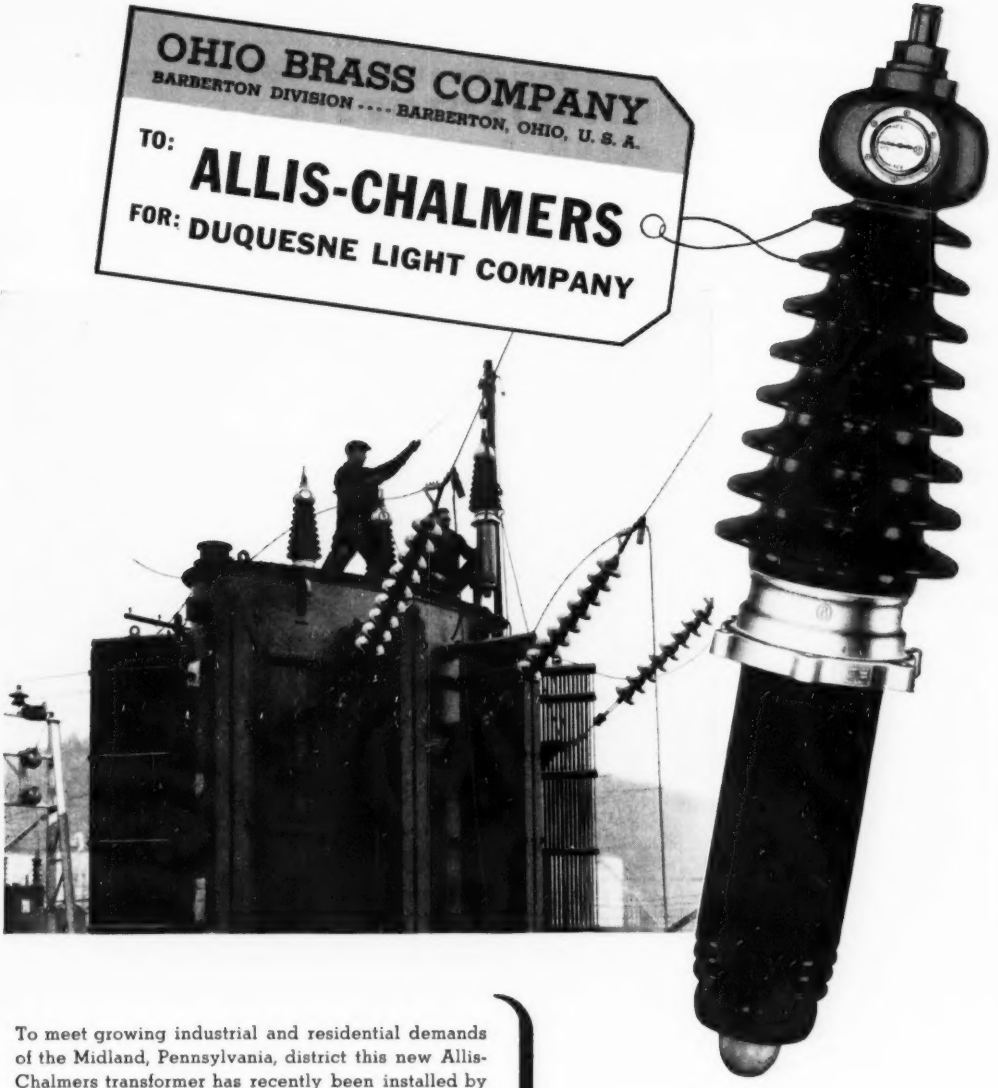
● A Pay Increase of 14.7% to conform to local rates paid by Bonneville and Portland General Electric is provided in a contract signed by Clark County (Wash.) PUD with the Technical Engineers' and Architects' union, AFL. The PUD engaged Dewey, Burton & Associates to handle engineering for conversion of more than 400 miles of 2,400-volt line to 12,000 volts. The engineers will be paid $55 per mile.

● FPC has published a new directory of electric and gas utilities in the United States. Compiled from reports filed with FPC during the first half of 1948, it may be secured from the commission, at Washington 25, D. C., for $5. Order number is FPC S-69.

OHIO BRASS COMPANY
BARBERTON DIVISION ---- BARBERTON, OHIO, U. S. A.

TO: ALLIS-CHALMERS

FOR: DUQUESNE LIGHT COMPANY



To meet growing industrial and residential demands of the Midland, Pennsylvania, district this new Allis-Chalmers transformer has recently been installed by the Duquesne Light Company. A-C points out a few of the distinguishing features of this unit--"Insulator strings deadend directly to the tank, thus eliminating overhead A-frame. Capacity 10,000 kva, with provision for a fan-cooled increase to 13,333 kva. High side, 66 kv delta; low side, 7 kv x 14 kv delta/12.1 kv x 24.2 kv Wye. Positive pressure inert gas oil preservation"....

AND (B) BUSHINGS

ONE OF THE FINEST COMPONENTS OF *ANY* TRANSFORMER

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Ohio Brass MANSFIELD, OHIO

TERRITORIES AVAILABLE to...

progressive, reliable

DISTRIBUTORS

AGENTS & DEALERS!

the New Improved...

"POLAR BREEZ"

AIR COOLER

If you handled the nationally accepted and profitable Hall line before the war, you'll be glad to know these top quality evaporative cooling units are again available with many improvements. "POLAR BREEZ" is sold in complete "packaged units" in various sizes for all types and sizes of business buildings and stores.

Air is purified by a chemical process removing bacteria and algae. Range—2000-25,000 C.F.M. . . . Glass Fibre Cooling Pads . . . Self cleaning—no servicing or replacement . . . Weather Proof Metal Housing . . . Multi-Blade Pressure Type Blower . . . Directional Flow Grille . . . Roto-Atomizer . . . Doubles cooling and washing action!

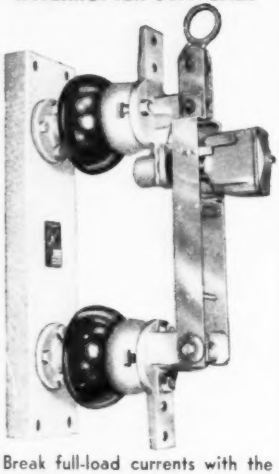
"Backed by over 25 years in the Industry." Formerly manufactured and distributed by the Hall Mfg. Co., Cedar Rapids, Iowa.

INVESTIGATE NOW! Write, wire, or phone for details—Morton Grove 4594.

AIR COOLING ENGINEERING CO.

Dept. W **Morton Grove, Ill.**

S & C "ALDUTI" INTERRUPTER SWITCHES



Break full-load currents with the arc fully confined within the interrupting unit.

Single-pole or three-pole operation, indoor or outdoor service.

Write for Bulletins No. 202A and 761

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Phone SUtter 1-7352

420 Market St. - San Francisco, Calif.

See Electrical West April 1949 Part II for

DIRECTORY OF MANUFACTURERS

WHERE-TO-BUY in the WEST

DIRECTORY OF APPLIANCE SERVICE and REPAIR PARTS

DIRECTORY OF WESTERN REPRESENTATIVES

Keep these Directories for reference throughout the year.

ELECTRICAL WEST

68 Post St., San Francisco 4, Calif.

NEWS ABOUT PEOPLE

● Montana Power Co.'s president, F. W. Bird, recently made known several changes in the personnel of the general officers of the company. M. E. Buck, vice-president and general superintendent, retired effective May 1, after 50 years of service. H. H. Cochrane, chief engineer, and A. C. Pratt, assistant chief engineer, have retired from active duty, but will serve as consulting engineers for the company. Carl Jordan, former assistant general superintendent, has taken over Buck's position as general superintendent. A. B. Martin, superintendent of the gas department, has been appointed chief engineer replacing Cochrane. E. A. Hamilton has been promoted to superintendent of generation. C. H. Kirk has taken on duties as superintendent of transmission and distribution.

● J. G. McKinley of Orinda, Calif., has been appointed farm sales supervisor for the northern California district of Westinghouse Electric Supply Co. He was formerly regional sales manager for Coast Counties Gas & Electric Co. in Contra Costa County.

● Ralph E. Gale has been appointed assistant to President T. E. Roach of the Idaho Power Co. Gale, who is a member of the board of directors, has been sales manager of the firm since 1936.

● Homer Graves, assistant designing engineer on Ross Dam, retired recently from Seattle City Light engineering department after 27 years of engineering work on the Skagit hydroelectric project.

● P. S. West of Puget Sound Power & Light Co., Seattle, has been elected chairman of the Puget Sound division of American Power Dispatchers Assn. W. L. McLaughlin, Seattle City Light, was elected secretary-treasurer.

● J. J. McLean has been named city light superintendent at Port Angeles, Wash., succeeding B. W. Lean, who has resigned. McLean was formerly city electrical engineer.

● Reg Plymire, assistant manager of the central division of Puget Sound Power & Light Co., Seattle, has been advanced to the position of assistant to the executive vice-president.

To simplify your motor repairs

USE THIS NEW GENERAL-PURPOSE* INSULATING VARNISH...

Here at last is a top-quality insulating varnish that you can use with real assurance in repairing ALL TYPES OF MOTORS (except extra high-speed armatures). It's General Electric's new 9574, developed after long research and careful testing under all kinds of operating conditions. These are some of the advantages that this material offers you:

G-E's 9574

OUTSTANDING
BONDING STRENGTH
Combines excellent adhesive properties with flexibility, plus extreme toughness and hardness. High-temperature bonding is excellent.

EXCELLENT
ELECTRICAL PROPERTIES
Dielectric strength (volts/mil) 1800—2000. After 24 hours in water at 25 C (volts/mil) 700.

UNUSUAL
CHEMICAL RESISTANCE
Salt-water resistance—Excellent
Alkali resistance—Excellent
Acid resistance—Excellent
Oil resistance—Excellent

Easier to use. G-E 9574 is a phenolic drying-oil varnish. It's remarkably easy to handle, yet it gives maximum protection as a general-purpose insulation. High flash point (100 F). And its viscosity of 250 C. P. average (at 45 F) makes it usable at barrel gravity. No special thinners required—use petroleum spirits.

Cures at low temperatures. This clear-baking varnish cures at low temperatures. A baking cycle as low as 212 F is satisfactory with conventional equipment. Also cures by infra-red.

Try 9574 on your motors—Simplify your repair work; note the exceptional resistance qualities it offers you to provide LONGER LIFE for the motors you repair. For more details, write for new bulletin to your local G-E Distributor or Section 24-5, Chemical Department, General Electric Company, Pittsfield, Massachusetts.

**G-E 9574 gives excellent results on all types of coils except extra high-speed armatures.*

You Can Put Your Confidence in

GENERAL ELECTRIC

Dr. G. W. Allison (right) was presented with an honorary life membership in the Northwest Electric Light & Power Assn. recently. Pat Johnson (left), past president of the association and vice-president of Puget Sound Power & Light Co., made the presentation

NOTES ON THE TRADE

● O. B. CLARK, president of the National Manufacturers' Assn. and vice-president in charge of sales for Westinghouse Electric Corp., and James H. Jewell, manager of apparatus sales for Westinghouse, were recent West Coast visitors. Clark said it is doubtful that cutbacks in production of some lines, notably domestic appliances, will mean much if any price reductions. Wage rates do not show much sign of going down and materials are down only very slightly. He feels that we are going into a much more stable period. Stabilization always carries with it a little recession and deflation. Jewell said Westinghouse still has a two-year backlog of orders for generators, power transformers and some other heavy apparatus, but that supply has caught up with demand in other respects. Both cited Westinghouse's $24 million investment in the West, and particularly continually expanding production at the Sunnyvale plant, as evidence of the company's complete confidence in the future of this area.

● S. E. HEYMANN has become branch manager at Los Angeles for the South Wind division of Stewart-Warner Corp., handling sales of home heating equipment and aircraft heating equipment in California. He was formerly general sales manager of the South Wind heating equipment division in Indianapolis.

● CRANE & Co., Sacramento, has taken on distribution of Climax evaporative coolers made by Climax Machinery Corp.

NEMA'S president, B. W. Clark (right), Westinghouse sales vice-president, accompanied by J. H. Jewell (standing), manager of apparatus sales, visited the company's Western plants and properties recently, among them Walter Willson's (left) new district offices in L. A.

● EDMUND L. CLARK, new Western regional manager for Presteline home appliances, will serve in the three Pacific Coast states and Utah, and will headquarter in Los Angeles. Before joining Presteline, Clark was associated with Leo J. Meyberg, major appliance distributor.

● REMLER Co., San Francisco electronics manufacturer, has been awarded six U. S. government contracts for electronic equipment in the stepped-up armed service program, it was announced recently.

● THE NEW DENVER representative of Allen-Bradley Co., manufacturers of electric motor controls, is Young Electric Mfg. & Supply Co., 2134 Curtis St. W. E. Young is owner and manager.

● BESSONE PLUMBING SUPPLY Co., Santa Rosa, is a newly appointed distributor for Modern Water Equipment Co., makers of water softeners, filters and water heaters.

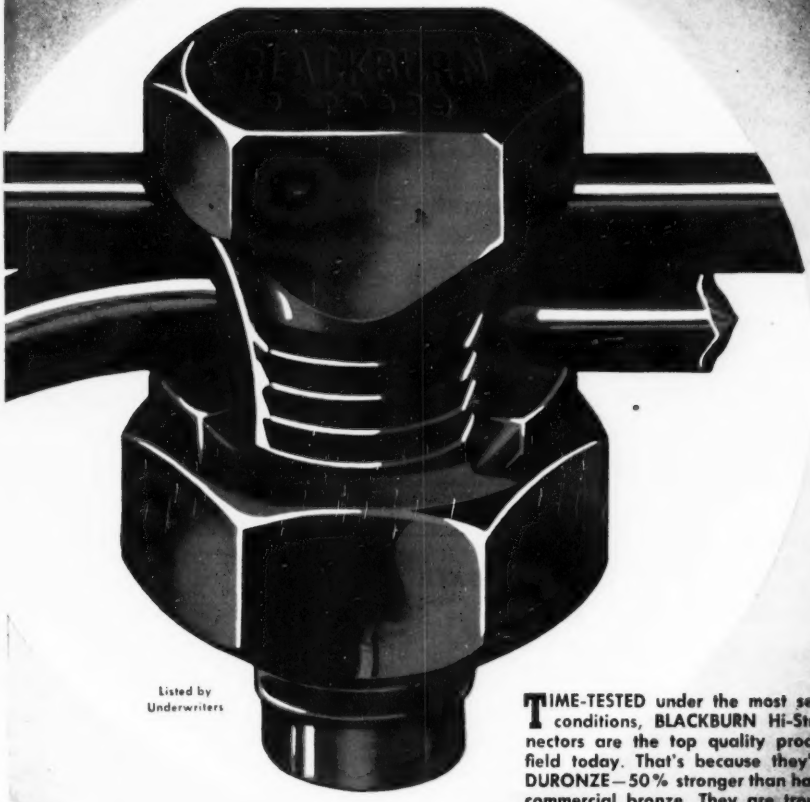
● RESIN INDUSTRIES, manufacturers of Vinyl-Resin tubing and stripping, has officially opened its new plant in Santa Barbara.

● ELECTROMASTER Inc. has appointed F. C. Stevenson as special sales representative for the West Coast area.

● TAY HOLBROOK Inc., San Francisco, has been named distributor for Economaster for northern California.

Executives of Pacific Electric Mfg. Corp. were "professors" for a day at the "plant-classroom" held at the company's shops in San Francisco for more than 100 Santa Clara University electrical engineering students. Here Joseph S. Thompson, president of Pacific Electric, explains the workings of electrical switchgear to one of the small study groups formed for "field work" at the plant

America's No. 1 Connector!



Listed by Underwriters

TIME-TESTED under the most severe service conditions, BLACKBURN Hi-Strength Connectors are the top quality product in their field today. That's because they're made of DURONZE—50% stronger than hard copper or commercial bronze. They are trouble-free on the line. They produce a more efficient connection. They last longer—will not season crack. They will not twist or distort when tightened up, and can be used over and over again. In short, they are the strongest—most economical—most satisfactory connectors made!

Stop in and inspect our plant when you are in St. Louis

JASPER BLACKBURN PRODUCTS CORP.
FIRST, MADISON & CLINTON STS. • ST. LOUIS 6, MO.
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BUILDERS OF QUALITY PRODUCTS FOR 15 YEARS

BLACKBURN Hi-Strength CONNECTORS

OVER 100 CONVENIENTLY LOCATED JOBBERS

Here's Wiring with a Future

Yes, a long future that's full of satisfaction to the home owner. For the home wired today with Paranite Building Wire — Paraflex — ABC Cable — Service Cable — will be giving the same efficient electrical service in 1998 and beyond. Every bit of Paranite wire or cable is made under the watchful eye of SQC—Statistical Quality Control! Nothing is left to chance. With Paranite's goal set high and Statistical Quality Control guarding each operation, you can confidently recommend and use Paranite Wires and Cables in all residential construction.

IF IT'S PARANITE IT'S RIGHT!

DISTRIBUTED THROUGH WHOLESALERS

PARANITE WIRE AND CABLE

Division of ESSEX WIRE CORPORATION

FORT WAYNE 6, INDIANA

ELECTRICAL WIRES AND CABLES *"BETTER THAN CODE REQUIRES"*

WAREHOUSES* AND SALES OFFICES *Atlanta, Ga., *Chicago, Ill., Cleveland, Ohio, Dallas, Texas, *Detroit, Mich., *Kansas City, Mo., *Los Angeles, Calif., *Newark, N. J., Philadelphia, Pa., *St. Louis, Mo., *San Francisco, Calif.

ILSCO
Electrical Connectors

MANY TYPES AND SIZES

WRITE for 54-page illustrated catalog.

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ILSCO COPPER TUBE & PRODUCTS, Inc. CINCINNATI, OHIO

MANUFACTURER SALES REPRESENTATION

Organization with salesmen of 25 years experience in the Electrical field desires additional line in the Chicago area.

We have established by long association valuable social and business friendships that are of value in the present-day buyer's market.

Desire quality line sold through Electrical Wholesalers on Commission arrangement.

Our efforts include missionary contacts in Steel Mills, Railroads, Industrial Plants, Electrical Contractors and Utilities.

Box No. 251, Electrical West
68 Post St., San Francisco 4, Calif.

OPENING available for local manager of small electric utility in Rocky Mountain area. No generation. Must be experienced in distribution operation, substations, metering, and public relations. Write full particulars. Box 250, Electrical West, 68 Post St., San Francisco 4, Calif.

MOTORS, GENERATORS, TRANSFORMERS

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Bought and Sold New and Rebuilt

ELECTRIC EQUIPMENT CO.
ROCHESTER 1, N. Y.

● GENERAL ELECTRIC apparatus department plans to set up expanded repair, maintenance and warehousing facilities in Salt Lake City for increasing service on G-E apparatus in the states of Utah, Idaho, Montana and Nevada, according to B. C. J. Wheatlake, manager of the company's Salt Lake City office. Service facilities will be housed in a new service shop and warehouse building, scheduled for construction this spring and planned to be completed by late summer.

● GENERAL ELECTRIC Co. now has an office at 323 S. Third St., Albuquerque, N. M., for its apparatus department sales office. F. C. O'Kelly, from the Denver G-E office, has been placed in charge of the office.

● SLAYBAUGH - THOMPSON Co., Denver, has been appointed to represent General Switch Corp. of Brooklyn, N. Y. The firm will service electrical wholesalers in Colorado, Utah and Wyoming.

● L. G. FISKE Co. Inc., Los Angeles and San Francisco, has been appointed distributor for room heaters and clothes dryers made by Appleman Art Glass Co., and Rota-Mixer made by Montgomery Tool & Engineering Co.

● WESTINGHOUSE ELECTRIC Corp. has announced that it will establish an office in Walla Walla, Wash., in the near future. Douglas P. Gunn Jr. of Portland will serve as sales representative in charge of the new office.

● LINE MATERIAL Co. has added several apparatus engineers to its staff of field specialists. H. T. Zamzow will work in the Mountain States division, and R. D. Besse in the West Coast division.

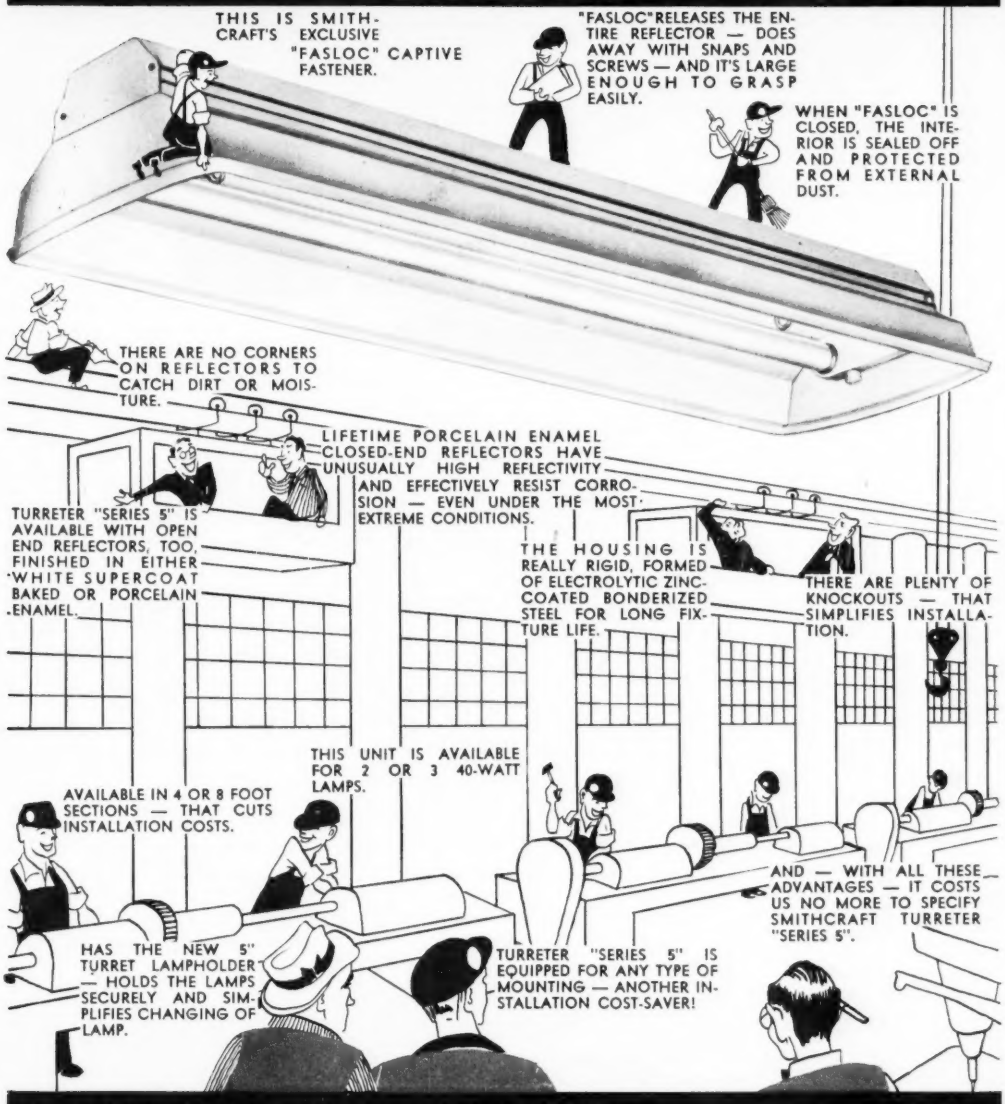
● BAILEY METER Co., Cleveland, Ohio, has expanded its staff of field engineers on the West Coast to include N. P. Campbell for the San Francisco office, and G. F. Fitzpatrick for the Denver office.

● VANCOUVER LIGHTING SUPPLY will open a new plant at 926 East Hastings St., Vancouver. It will continue to operate its offices and showrooms at 546 Howe St., Vancouver.

● J. C. VAN GROSS, West Coast representative for Superior Electric Co., has moved into larger quarters at 1436 N. Serrano Ave., Hollywood 27.

● GIVEN MFG. Co., Los Angeles, has appointed Stubbs Electric Co., Portland, as its distributor for the state of Oregon.

this is the sensational NEW Smithcraft TURRETER "Series 5"


THIS IS SMITH-CRAFT'S EXCLUSIVE "FASLOC" CAPTIVE FASTENER.
"FASLOC" RELEASES THE ENTIRE REFLECTOR — DOES AWAY WITH SNAPS AND SCREWS — AND IT'S LARGE ENOUGH TO GRASP EASILY.
WHEN "FASLOC" IS CLOSED, THE INTERIOR IS SEALED OFF AND PROTECTED FROM EXTERNAL DUST.
THERE ARE NO CORNERS ON REFLECTORS TO CATCH DIRT OR MOISTURE.
LIFETIME PORCELAIN ENAMEL CLOSED-END REFLECTORS HAVE UNUSUALLY HIGH REFLECTIVITY AND EFFECTIVELY RESIST CORROSION — EVEN UNDER THE MOST EXTREME CONDITIONS.
TURRETER "SERIES 5" IS AVAILABLE WITH OPEN END REFLECTORS, TOO, FINISHED IN EITHER WHITE SUPERCOAT BAKED OR PORCELAIN ENAMEL.
THE HOUSING IS REALLY RIGID, FORMED OF ELECTROLYTIC ZINC-COATED BONDERIZED STEEL FOR LONG FIXTURE LIFE.
THERE ARE PLENTY OF KNOCKOUTS — THAT SIMPLIFIES INSTALLATION.
THIS UNIT IS AVAILABLE FOR 2 OR 3 40-WATT LAMPS.
AVAILABLE IN 4 OR 8 FOOT SECTIONS — THAT CUTS INSTALLATION COSTS.
AND — WITH ALL THESE ADVANTAGES — IT COSTS US NO MORE TO SPECIFY SMITHCRAFT TURRETER "SERIES 5".
HAS THE NEW 5" TURRET LAMPHOLDER — HOLDS THE LAMPS SECURELY AND SIMPLIFIES CHANGING OF LAMP.
TURRETER "SERIES 5" IS EQUIPPED FOR ANY TYPE OF MOUNTING — ANOTHER INSTALLATION COST-SAVER!

Turreter "Series 5" by Smithcraft is a heavy-duty industrial fixture, designed specifically to meet the most exacting industrial requirements. Low initial cost, simplified maintenance and installation, comfortable cut-off from lamp glare, high construction standards . . . these and many other exclusive Smithcraft fixtures are important reasons for specifying the Turreter "Series 5" — by Smithcraft, manufacturer of America's finest fluorescent fixtures.

Smithcraft
LIGHTING DIVISION
CHELSEA 50, MASSACHUSETTS

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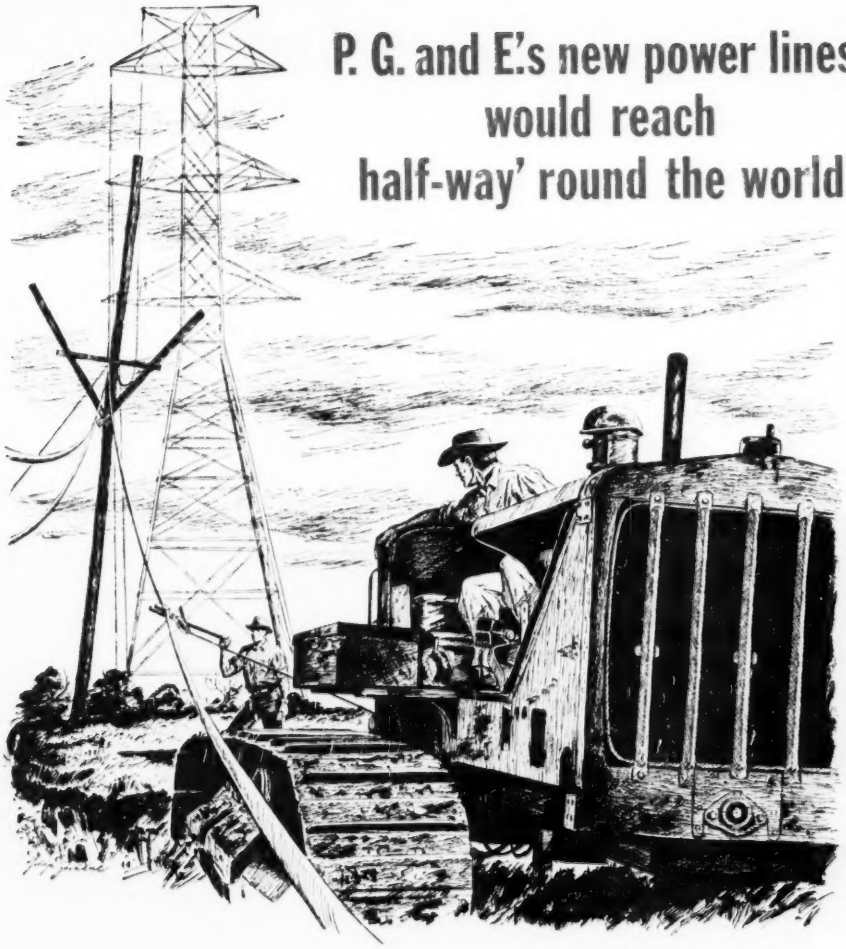
PROFILES

Leroy H. Bennett (right) recently was named manager of activities for the Northern California Electrical Bureau. The bureau re-elected as its officers (top picture): John S. C. Ross, chairman, executive committee; A. H. Meyer, vice-president; Harry Jackson, president; Frank K. Runyan, treasurer; O. R. Doerr, secretary. Section chairmen elected by the bureau (lower picture): George C. Tenney, education; A. H. Meyer, radio and television; W. H. Thompson, lighting; Fred D. Benz, wiring. R. S. Sloan, appliance section, was not present for the picture

At ground-breaking ceremony for PG and E's Antioch, Calif., steam plant: Harold Anderson, vice-president of power company; J. S. Moulton, vice-president and executive engineer; R. H. Gerdes, general counsel; S. D. Bechtel, president, Bechtel Corp., general contractors; Raymond Kindig, secretary

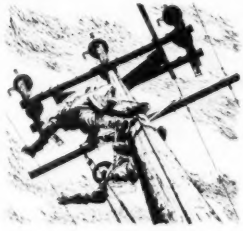
P. G. and E.'s new power lines would reach half-way' round the world



Helping speed the job are new methods and equipment like this radio telephone. With it an engineer can tell a distant winch operator just how much tension to put on the line as it is hoisted up and strung between towers

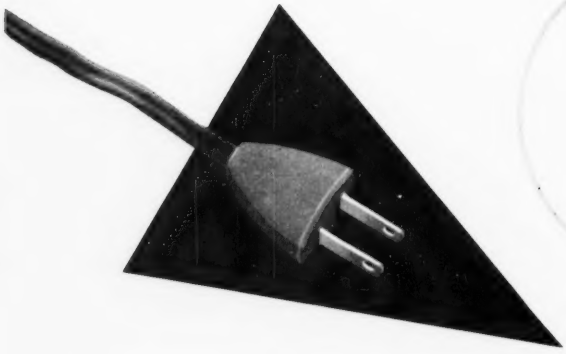
Swinging between towers and poles in Northern and Central California today are some 12,000 miles of new power lines . . . added since war-time building restrictions were lifted. And even more new lines are going up at the rate of 3,000 miles a year. That's three times as fast as prewar construction. All told, more than 50,000 miles of transmission and distribution lines are already on the job in the area we serve—America's largest inter-connected power network.

Work never stops on our power-building program



These new lines and half a million new horsepower are serving California's expanding industrial and agricultural activities. Last year alone, more than 71,000 new electric customers were connected to P. G. and E's system.

P · G · and E · PACIFIC GAS AND ELECTRIC COMPANY EW 105—549



adequate wiring—

a plug for sales!

There are many reasons why appliance dealers have a definite dollar interest in the promotion of Adequate Wiring. Certainly your interest in an appliance sale cannot end with delivery to the customer. If it did, you'd make nothing but first sales. It's important to your business that your customer gets satisfactory performance—and Adequate Wiring assures it.

Here's something else: If Adequate Wiring served no other purpose, its value in removing the installation obstacle to new appliance sales would make it worth every effort. Nothing pushes a sale more smoothly over the closing point than the simple installation instruction: "Just plug it in!"

PACIFIC COAST ELECTRICAL ASSOCIATION

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